THE IRON AGE

CHESTNUT AND 56TH STREETS, PHILADELPHIA, PA.
Sales Offices
239 WEST 39TH STREET NEW YORK, N. Y.

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Published every Thursday. Subscription Price: United States and Possessions, Mexico, Cuba, $6.00; Canada, $8.50, including duty; Foreign $12.00 a year. Single copy, 25 cents.

Cable Address, "Ironage, N. Y."

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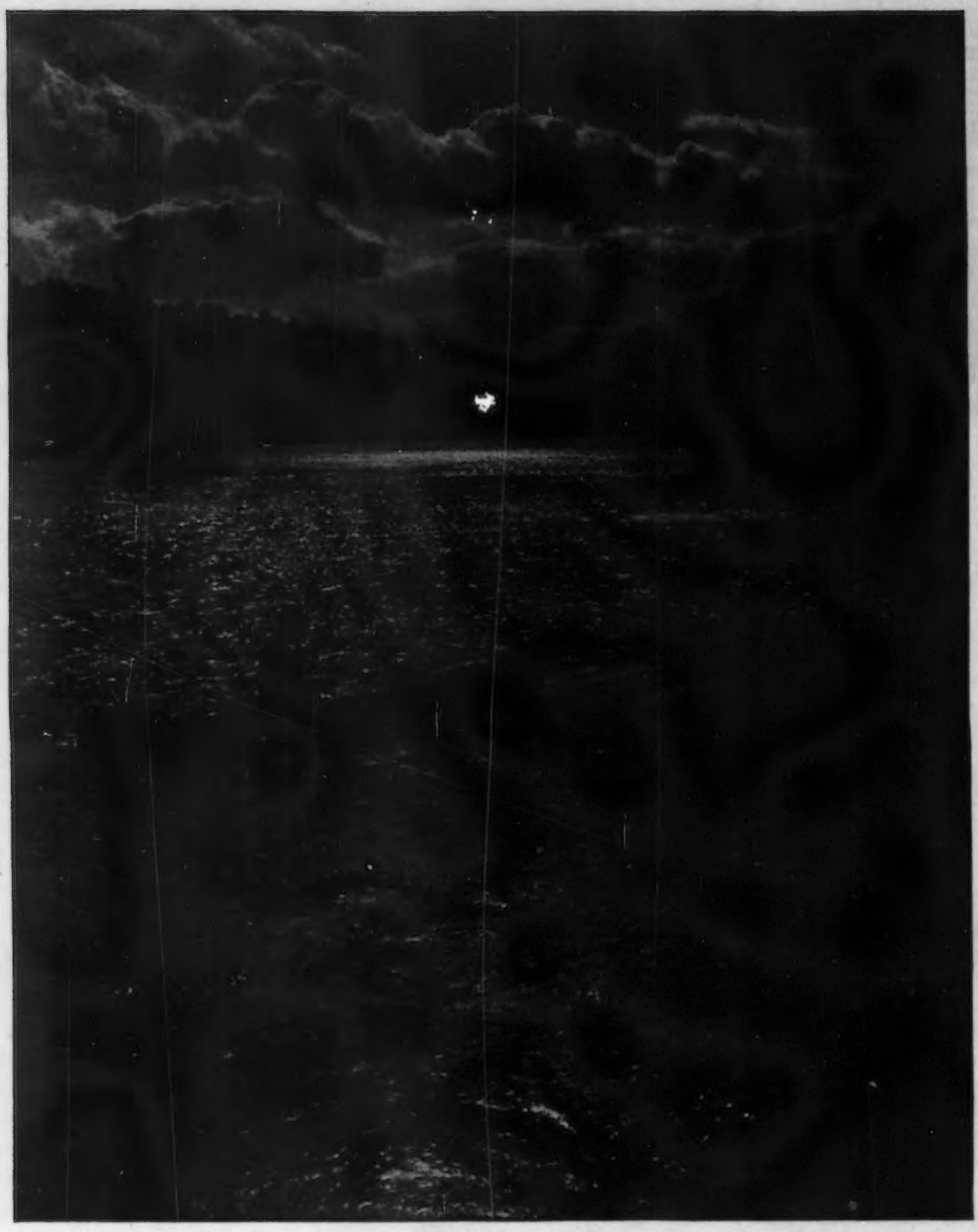

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JULY 11, 1935

ESTABLISHED 1855 Vol. 136, No. 2

Most Americans Choose to Choose

SAVINGS measure the difference between prosperity and depression. The wear and tear of time will cause replacements of consumer goods and, to a limited extent, of capital goods, but savings will not be risked in new ventures unless there is reasonable assurance of security and profit.

Saving implies the postponement of expenditures from the present to some time in the future. For that reason, no saver can object to the principle of higher taxation, provided that increased revenues are used to reduce the public debt, for it is only through balancing the national budget that the danger of ruinous inflation can be averted and the security of savings assured.

And few savers oppose the principle of proportionately heavier taxation of extreme wealth, provided that the purpose is to reduce the gap between Government revenues and expenditures. If, however, the primary aim is to redistribute wealth from one class of the population to another, all who have accumulated savings have reason to become alarmed. Taxation for redistribution would not necessarily stop after its initial application. Wealth, after all, is relative and what one man may regard as a moderate accumulation may seem like a fortune to another.

Theoretically it is, of course, possible to redistribute wealth by taxation. But what of the ultimate consequences? After wealth has been leveled, where would the savings so necessary to enterprise be found?

In Soviet Russia, the Government virtually commandeers all savings. What it does not take in taxation it obtains in the form of loans, since all savings must be invested in State securities. Even what is spent for living expenses reverts to the Government as the sole purveyor of goods. Hence the State, barring complications arising from international transactions, gets back all that it expends.

Such a system can work, for a time at least, but it entails complete extinction of individual freedom. No one can control the investment of his savings. No one can have any choice as to how much he can purchase or what he can purchase. The Government, and the Government alone, decides what is to be produced.

If, as at present in Russia, the State decides that savings shall go into the production of capital goods, the consumer must bide his time in the hope that the new productive equipment will prove efficient and at some future date will reward him with a higher standard of living. But even when that happy time comes, if it ever comes, the consumer will have to take what the State deigns to give him.

If he wants an automobile and has saved enough to buy one, he will be forced to take the car the Government has produced, provided it has turned out enough cars to supply the demand. If anything goes wrong with the car he will have to deal with one seller, the Government; he cannot threaten to transfer his future patronage to another manufacturer. If he is a power in politics he will probably get service. Otherwise not.

I am reminded of a recent experience. I had telephoned a member of a public commission for information. In the midst of the conversation he hung up on me. A typical example of bureaucratic discourtesy—and there was nothing that could be done about it.

Human nature cannot be so different in Russia. Power, without competitive responsibilities, inevitably begets arrogance. In a socialized State the individual has no option—as to the selection of vendors, as to the purchase of goods, as to the investment of savings. In all cases he must deal with the Government. There are no alternatives from which to choose.

Most Americans will choose to choose, when they fully realize that "share-the-wealth" programs, if carried to their logical conclusions, would condemn them to such complete political and economic serfdom.

G. L. LACHER

Managing Editor, The Iron Age

Light Waves in

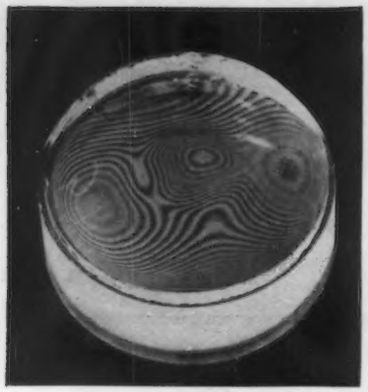


FIG. 1—In testing a surface with an optical flat the appearance of a pattern similar to a contour map indicates surface irregularities. The exact location of these irregularities and their characteristics are revealed to the hundred thousandth part of an inch.

FIG. 2—Parallel bands indicate absence of surface irregularities. In testing with light waves, the inspector estimates to the millionth part of an inch while measuring exactly to the hundred thousandth.

ONE of the primary factors in our ability to turn out masses of products that are satisfactory in performance is the ability to create machinery of unusual accuracy. This accuracy has come about by methods of measurement which have cut the tolerances in machine tools to fractions undreamed of fifty years ago. In the production of machine tools few things are more necessary than precision gage-blocks. A steel block about one inch in length is just a piece of steel, but with proper heat treatment, extremely refined lapping and measuring processes, it may be finished until the length is definitely known to be one inch within a limit of one-millionth. Without such an instrument manufacturing in mass on a basis of interchangeable parts would be impossible.

As difficult as is the mechanical achievement of securing accurate flatness and parallelism in the surfaces of such a block, the problem increases in difficulty when it is necessary, in addition to the flat, parallel surfaces, to attain a given length within one-millionth of an inch. The process is still further complicated when a complete series of blocks must be produced by progressive increases in size, or increments of one ten-thousandth of an inch.

Since the kind of steel used in a gage-block has much to do with the final success of the work, extreme care must be exercised in its selection. Many experiments have been made by the Bureau of Standards and gage manufacturers to determine the formula that offered the important qualities of permanence and stability. Carbon steel and chromium steel have proven most satisfactory. One manufacturer uses a chromium steel containing about 1.20 to 1.50 per cent chromium; from 1.00 to 1.10 per cent carbon; from 0.20 to 0.40 per cent manganese; not over 0.03 per cent phosphorus; and not more than 0.03 per cent sulphur. Such a steel resists wear and corrosion and, properly heat-treated and seasoned, is relatively free from changes in size and shape. As durability and permanence are important factors in making gage-blocks, the heat-treating process is an important and critical operation. The smallest variations in condition or structure may ruin the blocks. The stabilizing treatment must be controlled within a narrow range of temperature as this process is largely responsible for the permanence of the finished gages.

Owing to thermal expansion, material standards of length can only be correct to their nominal sizes at one particular temperature. Therefore, in machining parts to accurate dimensions it must be determined at what temperature the sizes shall agree with the figures specified. The measuring instruments should be adjusted to suit that temperature, commonly known as the standard temperature, or temperature of adjustment. In America, 68 deg. Fahr. is the standard in general practice in the engineering industries. While it is impossible to avoid some contraction and expansion in the blocks with changes of temperature, once a block is made to a predetermined size at a fixed temperature, it will

FIG. 3—By interposing a standard and a part to be tested between two optical flats, the difference in dimension of the two can be determined in millionths.

Precision Measuring

By EVERETT W. MELSON
Bausch & Lomb Optical Co.

usually return to that size when subjected to the original temperature.

No matter how accurate a precision gage-block may be to begin with, it is useless as a standard unless it retains its original accuracy. Changes which ordinarily would be unimportant are very serious in blocks made to obtain a range of dimensions varying by only 0.0001 of an inch. Here, errors of a few millionths cannot be tolerated.

And now the question is, how do we know that these gages are correct to within one millionth of an inch?

FIG. 4—Method of checking ball diameters or cylindrical surfaces by means of optical flats.

The possibility of the use of the wave-length of monochromatic light as a natural standard of measurement was first pointed out by Fizeau in 1864. He stated that a ray of light, with its extremely small but perfectly regular undulations, could be considered as a natural micrometer of the highest perfection and was eminently suitable as a standard of length. Michelson worked out a method of determining the number of wave-lengths of a certain monochromatic light in the length of the standard meter. His was the first successful attempt to refer a standard of length to a natural phenomenon. It is this phenomenon of optical interference that forms the basis of linear measurements in terms of wave-lengths of light.

Most of us have noticed the iridescence in a drop of oil floating on water. The tiny rainbows that appear are due to light wave interference. When light waves strike a surface they are reflected, and when two surfaces are close together, such as the top and bottom of an oil film, light waves are reflected from both surfaces, but because the distance is greater to the second surface, the reflections interfere, producing bands of color instead of white light.

Light waves possess all the necessary properties of fundamental units of length, the most important of which are constancy, reproducibility, accuracy of measurement and ease of application. Because they vary in length different color sensations are received by the eye. When two trains of waves from one point in a source, having traveled different paths, fall upon a point on the retina, the resultant amplitude of vibration determines the brightness. If they are "in step" maximum brightness results. But if the troughs of one arrive with the crests of the other, destructive interference takes place, resulting in darkness. If the two trains travel different distances, so that the difference in path is some whole number of wave lengths, then the waves will reach the eye in phase.

Measuring by Optical Flats

By the use of optical flats light waves are utilized in testing plane surfaces. If we take two perfectly flat pieces of glass, or preferably quartz, and lay one upon the other, touching at one edge but slightly separated at the other, a wedge-shaped film of air will be formed between them. If the surface being tested is irregular, the pattern assumes the appearance of a contour map, as shown in Fig. 1. The position and number of lines show the exact location and characteristics of the surface irregularities. If the surfaces are absolutely flat alternately colored bands will appear parallel and straight. The distance between the surfaces at the first dark ring is approximately

(CONTINUED ON PAGE 42)

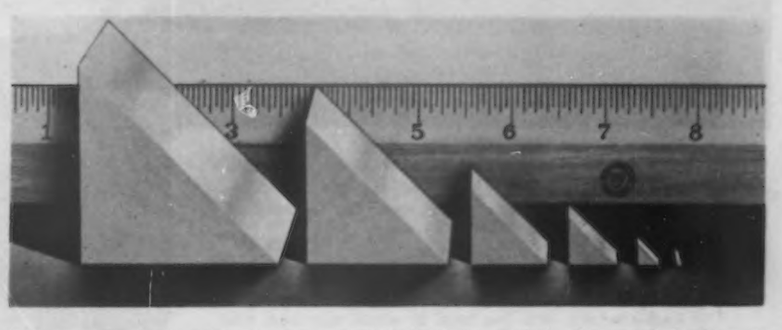


FIG. 5—The small prism at the right is about one-eighth of an inch in largest dimension. The angles are within ten seconds of specified value.

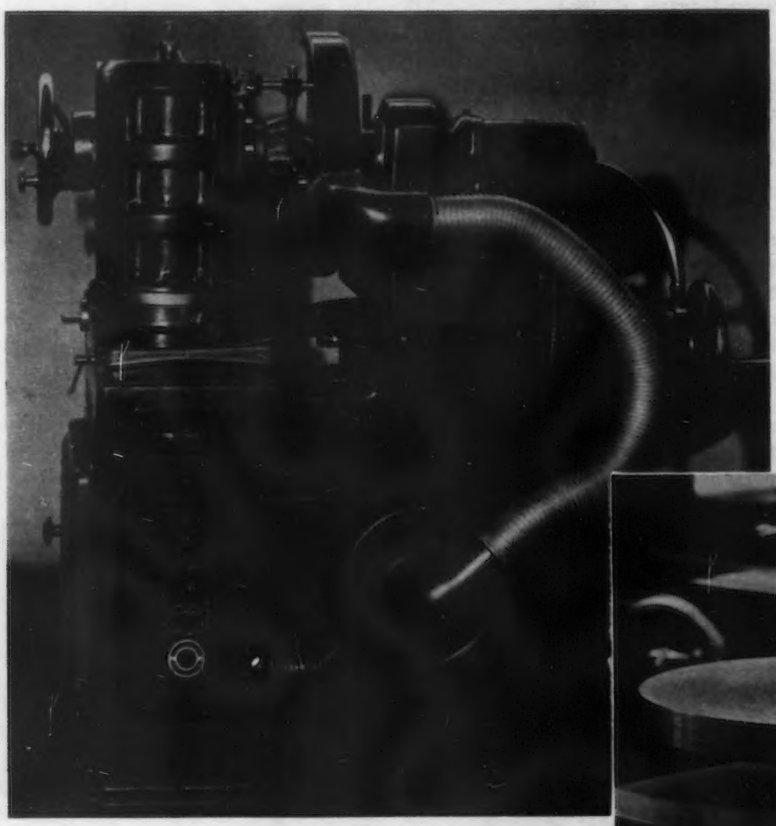
Practical Aspects of the Maintenance of

By FRANK W. CURTIS

Research Engineer, Kearney & Trecker Corpn., Milwaukee

CARBIDE tools are rapidly finding favor in machine shop practice. For many applications these tools, of various compositions as to base metals, have brought about as radical changes in practice and machine design as did the advent of high-speed steel. Development is still in progress, and while use is an old story in many shops that have made wide applications, nevertheless there are innumerable shops that have only a few carbide cutters and countless others where their use is merely contemplated. As is characteristic of all equipment there are two problems involved, application and maintenance. This article sets forth some of the practical aspects of the maintenance of carbide milling cutters.

In the first place a few words about care in shipment. The carbide tips must be protected against the possibility of being chipped. Mishandling may also result in damage to the brazing that binds the carbide tips to the cutter. The inference must not be drawn that these tools are particularly delicate, but like any fine tool they should receive the attention that is consistent with their cost and the quality of work that is expected from them. They should be packed tightly. Generally stout softwood boxes are satisfactory. In the case of milling cutters the bottom of the box is often fitted with a layer of heavy felt. The carbide tips rest in the felt during shipment and in many cases the user saves these boxes, the cutters being placed in them for safety in



SOME types of cutter grinders are fitted with an exhaust fan. These machines must be capable of doing accurate work and they must be properly maintained.

A SUITABLE lapping plate can be made of an 8-in. cast-iron disk into the face of which diamond dust is hammered.

Carbide Milling Cutters

IN addition to precautions relating to care in shipping and storing, this article gives considerable information on the grinding and lapping of carbide milling cutters. As the title indicates, it deals with the problem of maintenance, as distinguished from application.

handling them to and from storage on metal shelves.

The matter of storage involves safe-keeping because of the cost; further, carbide cutters are usually best segregated from other cutters unless all tools are handled by men who thoroughly understand the characteristics of the carbide equipment.

Many shops that are now coming to use carbide tools start with an operation here or there and cautiously buy the minimum of requirements.

At the start it is often not practicable to buy grinding equipment that will be satisfactory, and consequently tools must be returned at intervals to the seller for resharpening or reconditioning. From the practical point of view every installation should have an extra set of cutters. When only one cutter is purchased, there naturally will be lost time when regrinding is necessary.

Close-Limit Grinding Required

When the use of these tools has advanced to the point where it is possible to maintain them in the shop, real study must be given to the type and characteristics of the grinder to be purchased. Rigidity, strength and ease of operation are three of the prime necessities. Constant wheel speed and therefore ample power are recommended, because speed lag causes excessive wheel wear and lengthens the time necessary uniformly to sharpen a set of blades. Whether supplied as regular or special equipment the grinder that is to be used for milling cutters should have mounted on it, in a sturdy manner, an indicator that can be adjusted in two planes. Spindle endplay must be eliminated, and the spindle must be rigid. In a few words, the grinder that is to be used for carbide cutters should be capable of sharpening blades to a limit of 0.0002 in.

Some manufacturers give special attention to the removal of dust by means of a wheel hood and exhaust system with air filters. One theory is that in dry grinding the spark must travel far enough from the wheel so that it will be picked up by the suction and removed from the area where it will damage ways and bearings and destroy the accuracy of the machine. Seals do not always prove effective and many owners insist that grinders be oiled daily and at stated intervals taken apart, washed and cleaned.

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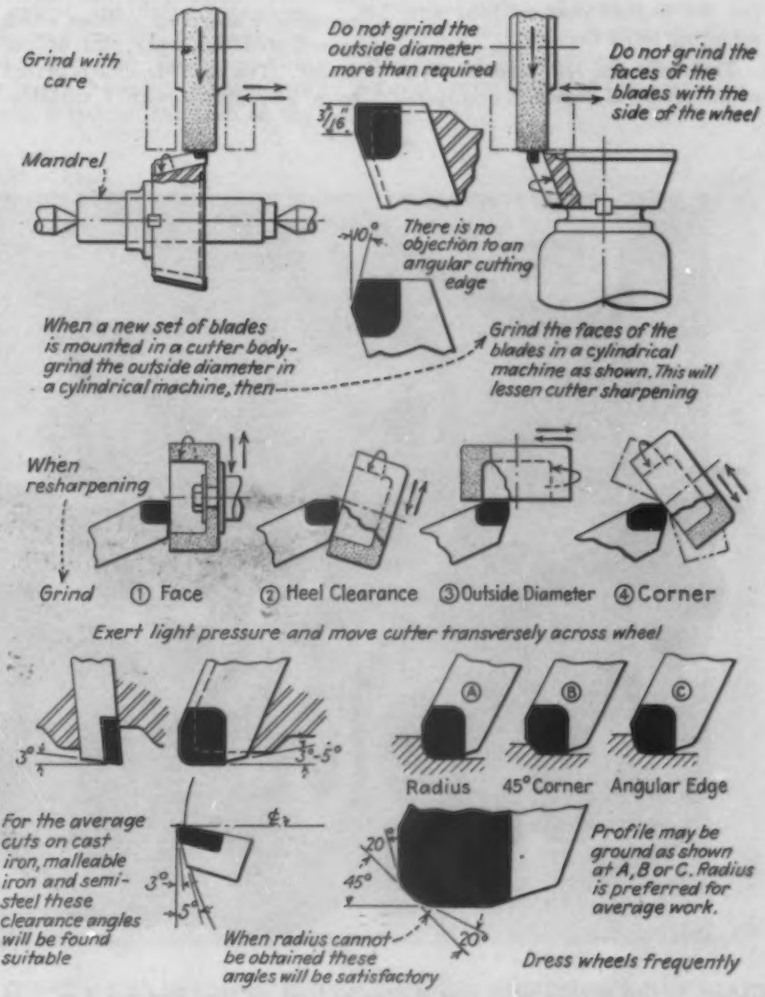

Grind with care
Mandrel
Do not grind the outside diameter more than required
3 1/16"
Do not grind the faces of the blades with the side of the wheel
10°
There is no objection to an angular cutting edge
When a new set of blades is mounted in a cutter body-grind the outside diameter in a cylindrical machine, then
Grind the faces of the blades in a cylindrical machine as shown. This will lessen cutter sharpening
When resharpening
Grind
① Face
② Heel Clearance
③ Outside Diameter
④ Corner
Exert light pressure and move cutter transversely across wheel
3°
3°-5°
Radius
45° Corner
Angular Edge
For the average cuts on cast iron, malleable iron and semi-steel these clearance angles will be found suitable
3°
5°
20°
45°
20°
Profile may be ground as shown at A, B or C. Radius is preferred for average work.
When radius cannot be obtained these angles will be satisfactory
Dress wheels frequently

THIS sheet gives essential data for properly grinding a carbide milling cutter.

Pontiac Uses Special Machines to Butt

WITH the development of sweeping fender lines, with deep crowns and long skirts, on its six-cylinder and eight-cylinder passenger cars, the Pontiac Motor Co. is finding it more economical and practical to make its front fenders in two pieces welded together rather than in one piece stamped out of a single steel sheet. Probably the outstanding achievement in connection with this job is the butt flash welding of the outer and inner sections of the fender, each 90 in. long, the welding being done with such perfection that the flash or burr is ground off and prepared for the enamel coat without any soldering being necessary.

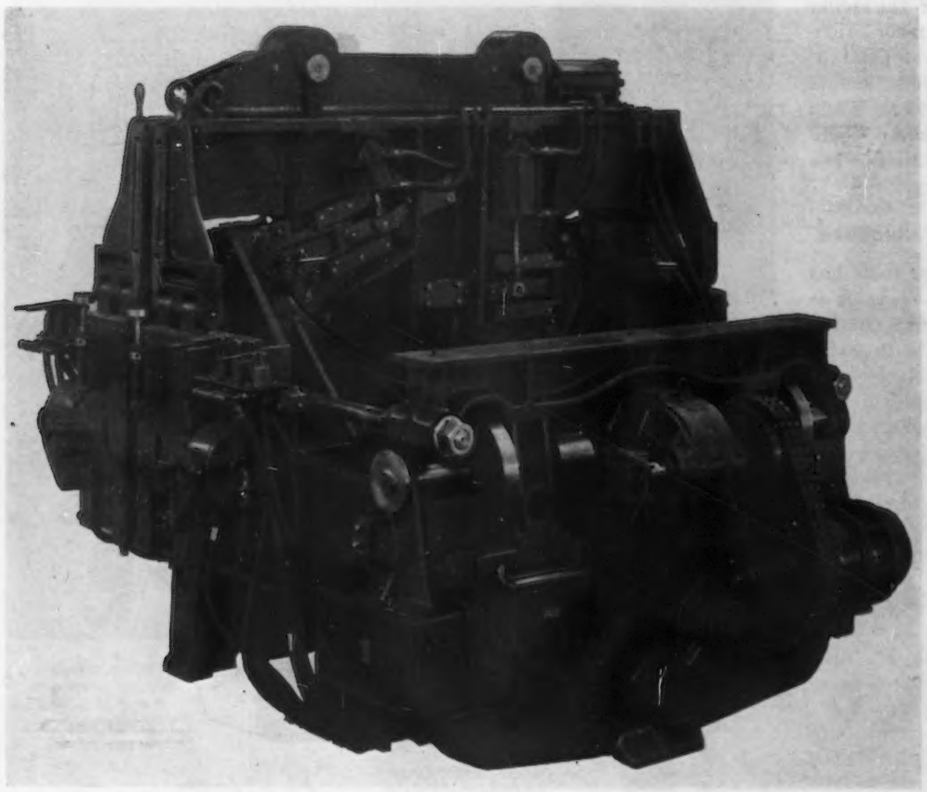
The right and left inner section of the fender is drawn in one operation on a triple-action toggle press from a 19-gage steel sheet 43½ x 89 in. of rectangular shape which tapers down to a width of 22 in. In the trimming die the stamping is cut in half by a shear which is part of the die. The outer left front section and inner left front section then are flash welded on special Taylor-Winfield Corpn. machines, four of which are used for this purpose.

These machines are similar in construction to body panel welders. The main base frame carries a stationary slide on which dies and locating and clamping fixtures are mounted. Directly in line is the movable or upsetting slide on which is mounted the other half of the fender. The movable slide is driven by a 5-hp. motor with a variable-speed drive operating through a gear reduction unit to the camshaft.

Clamping arms are of heavy, rigid construction and are hinged at the rear of the machine so that they can be raised while the stampings are being placed in the dies. The hinges are carried on vertical slides, as are the latches on the front end of the machine. Hence, when the two stampings are in position to be welded, air cylinders at either end exert a downward pull simultaneously until the weld is completed, when the pressure is released and the arms ascend for the next loading.

Welding dies are made of special aluminum bronze castings formed to the contour of the fender. Uncommon accuracy is required in the dies, the reason being that, with normal commercial variations in the sheet stock, any inaccuracy tends to throw the abutting sheets out of line. The result would be defective welds or welds which are difficult to finish.

The dies are made in three segments, the center section being fixed to the clamping arm proper. At each end of the center section the other segments are carried in slides, movement being provided by air cylinders attached to the clamping arms. This construction is necessary because the weld line is of semi-circular contour and the pressure necessary to hold the stock in the dies cannot be



FLASH welding machine which joins the two parts of the front fender in 6 to 7 sec. Clamping arms are hinged so that they can be raised while stampings are placed in the welding dies made of special aluminum bronze castings. o o o

Flash Weld Fenders

PONTIAC front fender is stamped in two parts, an outer and inner section each of which is 90 in. long. The two are welded so perfectly that the flash is ground off and the fender prepared for the enamel coat without soldering being necessary.

secured with pressure in one direction only.

The upsetting slide is faced with hardened and ground steel wear plates and provided with take-up adjustments to compensate for wear. All bushings and pins are of hardened steel, which is used to prevent undue wear of parts subject to hard service and to help maintain accuracy over a long period. Thus the life of the machine is increased and the cost of upkeep lowered.

Each welding machine is equipped with two 300-kva. pancake-type transformers with water-cooled copper secondaries connected in parallel to the die terminals to give even distribution of heat throughout the length of the weld. Each transformer has an eight-step voltage changing regulator to adjust the heat to suit the job. The current is turned on to the transformers by means of auxiliary switches actuated by a fan cam on the camshaft, which operates a special 1200-amp. magnetic contactor arranged with four poles, two poles being used for each transformer. This arrangement of the contactors assures the current being turned on and off the two transformers simultaneously. The motor is operated by push button control, being stopped automatically at the completion of the welding cycle.

The capacity of each machine is 80 to 100 welds an hour. Actual time per weld is 6 to 7 sec.

After the two parts of the fender are welded, the flash is removed inside and outside by means of portable grinders. Special precautions insure the safety of the operator who grinds off the flash on the inside of the fender; he wears a protective mouthpiece, goggles, cap, leather apron, armlets and gloves. The outside surface of the fender is polished with hand tools by metal finishers, the fender resting on a wooden buck on platform cars on an oval conveyor during this operation.

RIGHT and left inner section of fender is drawn in one operation on a triple-action toggle press. In the trimming die the stamping is cut in half by a shear which is part of the die.

o o o

A New Method of Heat-

A special normalizing process developed by the Illinois Steel Co. for use in the production of rails is resulting in a product of greater ductility and resistance to impact, and with far greater resistance to wear and to end batter. Also of importance is the anticipated elimination of the conditions which give rise to transverse fissures and other serious interior defects.

Investigations described in this article have been carried out in the laboratories and at the rail manufacturing plant of the Illinois Steel Co. under the supervision of the writer and A. D. Beers by the Gary Works metallurgical organization, in consultation with the metallurgical staffs of the other rail-producing subsidiaries and the personnel of the research laboratory of the United States Steel Corpn.

What Tests Showed

One of the first investigations made was to determine the cause of rail breakages at low atmospheric temperatures. Impact tests were made on standard full-size rail test pieces in a rail drop testing machine at various temperatures between plus 60 deg. F. and minus 45 deg. F. These tests developed that the impact resistance of rails decreased rapidly with the temperature, especially in rails with high hardening properties such as are required by the present-day rail specifications. This investigation covered over 2000 full-size impact tests and required about two and one-half years.

After this investigation had been completed another investigation was made to determine if so-called "transverse fissures" or interior progressive fractures could be produced in new rails through repeated stresses approaching the yield strength of the steel in the rails. This investigation resulted in valuable information in that it showed that transverse fissures could be produced in various transverse locations about the middle of the rail head, depending on the place of the application of the load on the top of the rail. Failure of the rails under the low temperature tests and under the fatigue tests began in the coarser grain structure in the interior of the rail heads and spread to the surface.

Taking Advantage of War Experience

Based on these findings, an investigation was planned to develop means of refining the grain structure in rails by a thermal treatment. Many of the investigations made on controlled cooling and other thermal treatments on ordnance and munition materials produced during the war period revealed means to eliminate interior ruptures found in alloy and carbon steels in large sections.

Interior ruptures found in steel at that time were given the name "flakes," on account of their appearance. They were small and were evidently formed through cooling stresses which were of such magnitude as to split the grain structure in the steel as it passed through the brittle cooling ranges. They were, in this respect, related to interior ruptures called "shatter cracks" which were later found in the interior of rail heads.

At the close of the war several processes of treating rails were tried with the object in view of improving strength and quality. These investigations included con-

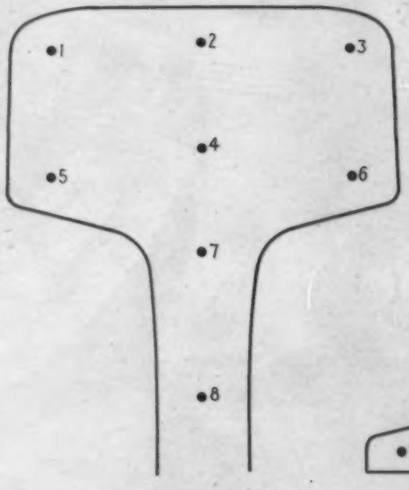


FIG. 1—Diagram showing the locations of Brinell hardness determinations in a normalized 112 RE rail. These figures may be interpreted by the data shown in Table I. Note how the hardness drops in the lower part of the rail, and also at a greater distance from the end of the rail.

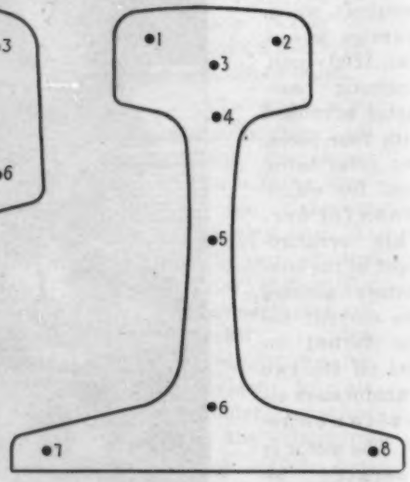


FIG. 2—The hardness data shown in Table II correspond to the points in this figure. Rails of like analysis were tested in a normalized condition and in a regular hot-bed cooled condition. There is a more gradual change in hardness for the normalized rail.

Treating Rails

By JOHN BRUNNER

Manager, Department of Metallurgy and Inspection, Illinois Steel Co., Chicago.

trolled cooling, reheating and quenching in various quenching mediums, with subsequent drawing or stress relieving and special methods of normalizing.

Quenching and Drawing Tried

In investigating the quenching and drawing process it was found that the rails would have to be reheated before they were cooled into the so-called "brittle ranges," and that the quenching operation should not be longer than to carry the center of the head slightly below the critical range in order to obtain the best results in ductility and prevention of "thermal ruptures." Rails produced by this process were high in physical properties and impact resistance. However, the estimated cost of equipment and operation for the production of quenched and drawn rails was found to be high, and this process of thermal treatment did not appear to be practical in the production of rails from an economical point of view except for special severe service requirements.

The controlled cooling process was further studied and developed in its application to rails, and the temperatures at which interior ruptures may develop in rails were determined. Hardening the ends of rails by an air blast applied at the time the rails reached the upper limit of the critical thermal range was also developed. While this method of treatment, if carried out thoroughly, eliminated interior ruptures, it lacked the most important feature, namely, the refinement of the grain structure, which is required to resist the impact stresses to which the rails are subject under rapidly moving loads, especially at low temperatures. The controlled cooling process was also found to be deficient in uniformity in that the outer rails protected by hoods or boxes cooled at a more rapid rate than the rails toward the middle of the charge.

Special Normalizing Process Developed

A special normalizing process was found to be the most promising in that it refined the grain structure and within the proper ranges of cooling, prevented the formation of "thermal ruptures" or "shatter cracks."

By applying drastic cooling, reheating and final cooling, it was demonstrated that even under such adverse conditions the damage to the steel through stresses in the rail head would be minor. The process could, therefore, at all times be so regulated that internal stresses would be reduced to a minimum and thermal ruptures entirely prevented. In manufacturing rails by this process, the rails, after they are rolled, are not allowed to cool through the brittle ranges until after they have passed through the thermal treatment and have obtained a refined grain structure of sufficient ductility to resist the cooling stresses without rupture. Rolling and cooling stresses produced in the rail mill are reduced to a minimum by this process. To further prevent stresses, controlled slow cooling is applied.

In the further development of this process, hardening of the ends of the rails before the final cooling was added, thereby producing a quality of rail which best covered the general requirements in railroad track service, both as to safety and resistance to wear.

Limited Air Cooling Followed by Reheating

This special normalizing process consists of air cooling the rails after they have left the mill until they reach a temperature, in the interior of the rail section, slightly

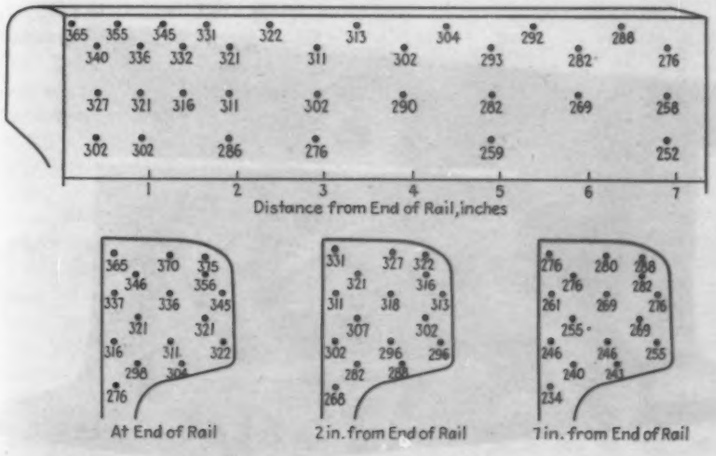


FIG. 3—These Brinell numbers show the variation of hardness in a normalized rail, both as the distance from the end increases and measurements are taken at a greater distance from the surface. Note how the extreme end of the rail is the hardest. Rail analysis is 0.73 C, 0.73 Mn, 0.033 P, 0.031 S, and 0.24 Si.

TABLE I

Hardness Data on Three Types of Normalized Rails (Location of points are shown in Fig. 1)

Analysis	Distance From End of Rail in Inches	Brinell Hardness Locations as Shown in Fig. 1							
		1	2	3	4	5	6	7	8
C =0.69	⅛	351	364	351	321	311	302	286	262
Mn =0.85									
P =0.024	1	332	340	340	321	302	302	286	255
S =0.032									
Si =0.20	3	311	321	321	302	293	302	269	255
	7	302	302	302	386	293	293	262	248
C =0.74	⅛	364	364	364	340	321	321	321	286
Mn =0.78									
P =0.025	1	340	340	340	321	311	311	302	269
S =0.036									
Si =0.18	3	321	332	332	321	302	302	293	262
	7	311	311	311	293	286	293	269	255
C =0.80	⅛	375	379	375	340	325	321	304	300
Mn =0.82									
P =0.023	1	360	364	364	338	321	321	304	286
S =0.024									
Si =0.22	3	332	340	340	321	318	321	288	269
	7	321	321	321	293	300	300	275	269

TABLE II

Brinell Hardness Determinations for Normalized and Hot-Bed Cooled Rails

Ladle Analyses Showed 0.75 C, 0.92 Mn, 0.034 P, 0.028 S and 0.23 Si	Location Number Shown in Fig. 2	Brinell Hardness
Normalized Rail	1	251
	2	251
	3	251
	4	251
	5	255
	6	255
	7	265
	8	265
	Average	256
Hot-Bed Cooled	1	255
	2	255
	3	255
	4	255
	5	255
	6	255
	7	269
	8	269
	Average	259

below the so-called "thermal critical range," and before they have reached the thermal brittle range. They are then placed in a furnace and reheated to a temperature slightly above the thermal critical range.

The rails are held in the furnace until the entire rail section has reached a uniform temperature. After they are taken out of the furnace, blasts of compressed air are applied through special nozzles to the top of the rail head at both ends for a sufficient length of time to obtain the hardness desired at these particular locations.

Hardness Controlled by Air Quenching

Rails so normalized have a hardness close to that of the hot-bed cooled rails, which is an average of about 260 Brinell. A more explicit designation of the hardness values is shown in Fig. 1, which may be interpreted by the data shown in Table I. Also, the difference in hardness of normalized and hot-bed cooled rails of like analysis is shown by the data in Fig. 2 and Table II. By the compressed air quenching, the hardness of the ends can be brought up to a desired value of between 375 and 400 Brinell at the top of the rail at the ends. From that point, the hardness decreases to the regular hardness of the rail head in a distance of from 12 to 15 in. along the top of the rails and from 1¾ to 2 in. downward

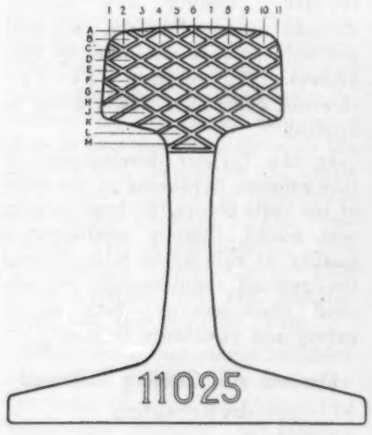


FIG. 4—In order to determine equal stress lines, the end of a rail section was first machined and then ground. The rail head then was divided into diamond-shaped sections, as shown here.

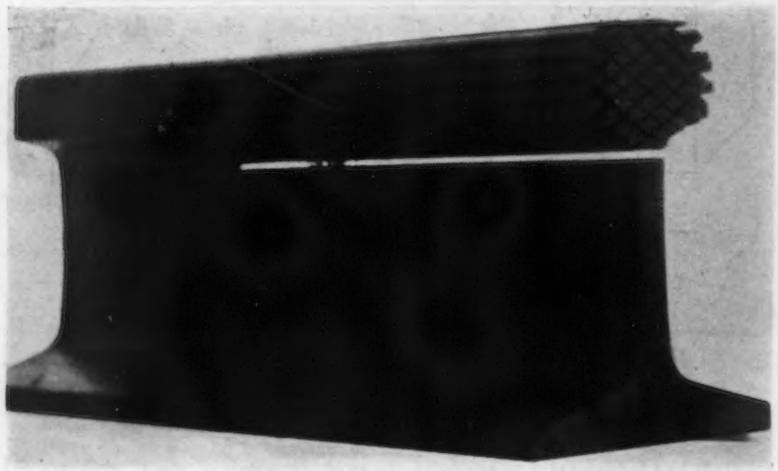


FIG. 5—This rail head has been cut apart by means of a band saw. A cutting compound kept the rail cool. Lengthening or contracting of individual diamond-shaped sections gives an indication of stress distribution.

along the ends of the rail sections. These distances can be regulated as may be desired. The heat of the rails slightly draws back the air-quenched part of the rail head so that there is no demarcation zone between the hardened part and the unhardened part. There is, therefore, no plane or zone along which a split or fracture can take place in service. Another demonstration of the extreme hardness of the rail end may be seen in Fig. 3. Note also how the hardness decreases gradually as the distance from the rail end and from the rail surface increases.

This process can be regulated automatically throughout so that the human equation, subject to errors, can be eliminated and thereby a uniformly treated product obtained.

Testing the Results

The method by which equal stress lines were determined consisted of, first, machining and grinding the ends of the rail to a uniform surface square to the longitudinal dimension of the rail. The rail head was then divided into a number of diamond-shaped sections and cut apart for a predetermined distance with a fine band saw run through a cooling medium so as to prevent heating of the steel in the sawing operation. A diagram showing this method of dividing the rail head is given in Fig. 4. In Fig. 5, an actual photograph of a sawed rail is shown. Through these cuts the different pieces are released from each other and the part of the rail head which had compression stresses showed an elongation in these pieces, while the part of the rail head which had tension stresses shows a contraction.

Sections were separated by steel bands of the same thickness as the width of the saw cut, and the entire section of the rail head tied together with wire so that each piece would be drawn back in its original position.

The sections which represent the part of the rail head which had been in compression before sawing elongate, and the sections which represent the part of the rail head which had been in tension before sawing contract, leaving the sections of the rail head of an unequal length by the change caused through releasing the stresses.

Each part of the sawed rail head was then measured by a micrometer attached to a weight resting on the rail end and the micrometer adjusted for readings of the change in length of the different sections. In this manner the stress lines in a new rail and in a rail after four years of service were determined. These figures are given in Fig. 6 and may be interpreted by the data in Table III. Note the greater strains in the used rail.

While these sections are not small enough to fully show the maximum and minimum stresses in the rail head, they are made as small as practicable and their

TABLE III

Data for Translating the Numbers Given in Figs. 6 to 8 into Compression or Tension Stresses

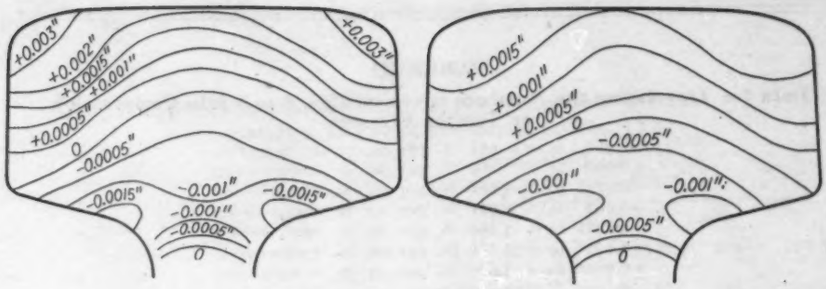
+0.005	in. =	15,000 lb. per sq. in. compression
+0.003	in. =	9,000 lb. per sq. in. compression
+0.0025	in. =	7,500 lb. per sq. in. compression
+0.002	in. =	6,000 lb. per sq. in. compression
+0.0015	in. =	4,500 lb. per sq. in. compression
+0.001	in. =	3,000 lb. per sq. in. compression
+0.0005	in. =	1,500 lb. per sq. in. compression
0	=	neutral zone
—0.0005	in. =	1,500 lb. per sq. in. tension
—0.001	in. =	3,000 lb. per sq. in. tension
—0.0015	in. =	4,500 lb. per sq. in. tension
—0.002	in. =	6,000 lb. per sq. in. tension

TABLE IV

Results on two companion rails, one a "B" rail from ingot 12 and the other a "B" rail from ingot 13. One rail was special normalized and the other was cooled on the hot bed.

Heat Number Rail Number and Treatment	Specimen Number	Number of Blows	Permanent Set—In.	Per Cent Elongation per Inch					
				1 In.	2 In.	3 In.	4 In.	5 In.	6 In.
54031 B-12 Special Normalizing Process	1	1	0.80						
		2	1.35	8	8	7	6	5	5
		3	1.85						
		4	2.30						
		5	2.85	14	16	13	9	8	7
			Twisted—Test discontinued						
	2	1	0.80						
		2	1.40	5	7	8	7	6	6
		3	1.90						
		4	2.40						
		5	2.80	16	20	17	14	11	9
			Twisted—Test discontinued						
	3	1	0.75						
		2	1.35	5	6	7	7	7	5
		3	1.90						
		4	Broke	7	10	12	14	15	10
	4	1	0.80						
		2	1.40	6	7	8	8	7	5
		3	1.95						
		4	2.35						
		5	2.90						
		6	3.40	13	16	16	11	10	9
			Twisted—Test discontinued						
	5	1	0.80						
		2	1.40	5	8	9	8	7	6
		3	1.90						
		4	2.40						
		5	Broke	8	9	12	15	16	12
	6	1	0.80						
		2	1.35	5	7	7	6	5	4
		3	1.90						
		4	2.30						
		5	2.80						
		6	3.40	12	16	15	13	10	9
			Twisted—Test discontinued						
54031 B-13 Hot-Bed Cooled	1	1	0.75						
		2	Broke	4	5	6	6	7	6
	2	1	Broke	2	2	3	4	3	3
	3	1	0.75						
		2	Broke	3	4	4	4	5	6
	4	1	Broke	1	2	2	2	3	2
	5	1	0.80						
		2	Broke	3	3	3	4	4	4
	6	1	Broke	2	2	3	3	3	2

C 0.73. Mn 0.92. Phos 0.034. Sul 0.028. Sil 0.23.



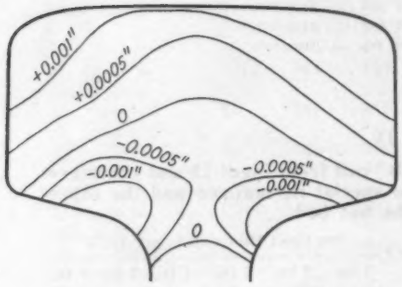


FIG. 7—Diagram showing the distribution of initial stresses in hot-bed cooled (upper left), slow-cooled from 600 to 200 deg. F. (upper right), and a normalized rail (bottom). The numbers indicate length increments and correspond to the stresses shown in Table III. The normalized rail has the lowest initial stresses.

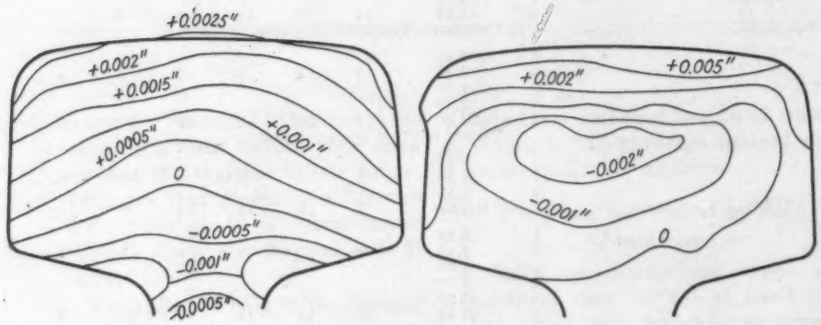
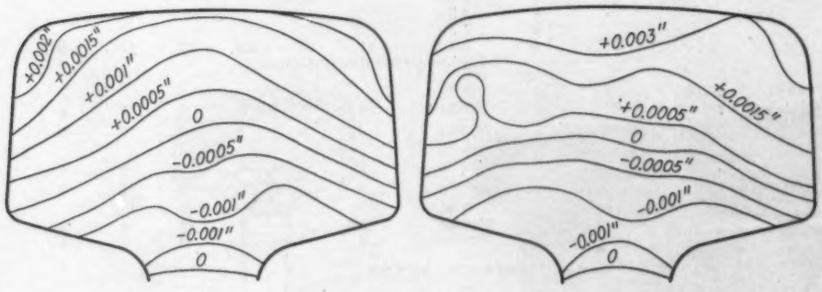


FIG. 6—Comparison of stress lines in a new rail (left) and in a rail after four years of service (right). These figures may be translated into stress figures by the data given in Table III.



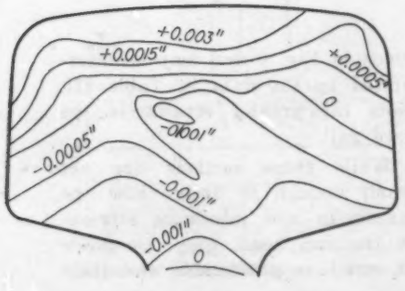


FIG. 8—Stress lines in hot-bed cooled rails before use (upper left), after service of one month (upper right), and after service of six months (lower). These figures may be interpreted by the data shown in Table III. Note how the stresses increase during service.

elongation or contraction is an indication of the approximate location of compression and tension stresses in the rail head. In Fig. 7 are shown three diagrams giving the distribution of initial stresses in ordinary hot-bed cooled, slow-cooled and normalized rails. The numbers indicate length increments and correspond to the stresses given in Table III. Note how the initial stresses are a minimum in the normalized rail.

The stresses in ordinary hot-bed cooled rails increase during service, as shown in Fig. 8. This increase for ordinary rails may be compared to normalized rails by comparing Fig. 8 with Fig. 6. A comparison of the permanent set and elongation of normalized and hot-bed cooled rails is given by the data in Table IV.

The greater ductility and resistance to impact will tend to eliminate most of the weaknesses found in rails in service, especially at low temperatures, such as broken bases, square breaks, transverse fissures, etc.

End battering, which limits the life of the rail in service, and which is a source of vibration, noise and wear on rolling stock, is retarded to a minimum by the special hardened ends. The slightly greater hardness of the lower part of the head at the ends of the rails where the joint bars bear against the rails, reduces the wear of the rails at this point.

A large number of American railroad systems have installed test tracks of the rails produced by this method of thermal treatment. These tracks are being closely observed, and the wear and battering measured and compared with hot-bed cooled rails, and in a few cases, with slowly cooled rails.

The United States Circuit Court of Appeals for the seventh circuit recently handed down a decision in the case of the Cleveland Crane & Engineering Co., Cleveland, vs. the Richards-Wilcox Mfg. Co., Aurora, Ill., in which the decision of the District Court of the Northern District of Illinois, Eastern Division, was sustained. The District Court held that the patent in suit, held by the Cleveland Crane & Engineering Co., was invalid and that the Richards-Wilcox Mfg. Co. had not infringed the patent. The patent in suit involved the use of a monorail track as a current conductor.

Today's Machine Tool Problems

By SOL EINSTEIN

Chief Designer, Cincinnati Milling Machine Co., Cincinnati

INSTEAD of a relatively few types and sizes of machine tools, as of old, modern shops require standard, semi-special and special machine tools in undreamt-of variety and great multiplicity of sizes. This diversity of requirement has brought problems to the machine tool builder, as have improper care of machine tools, and the tightening of tolerances. Consulting service, usually gratuitous in tooling problems, is commented upon, and a plea is made for closer cooperation between users and builders of machine tools. This article is from a paper presented by Mr. Einstein at the semi-annual meeting of the American Society of Mechanical Engineers held at Cincinnati, June 17-21.

IF the older engineers could turn time back to the days when they entered the profession, and could draw a picture of the conventional machine shop, we would see at first glance a mass of transmissions through the full length of the shop with belts to countershafts and more belts from the countershafts to individual machines. We would see a large number of machine tools generally grouped as to types and in appearance slightly different from each other, but even as to types and sizes there would not be a great variety to be observed.

Such old friends as the planer and shaper, the engine lathe, the drill press and radial drill, the knee-and-column type milling machine and the Lincoln-type miller, a few universal grinding machines and some tool grinders, were the normal equipment in those days. Instead of the grinding machines, we would observe a few speed lathes and for the production of gears milling machines with index heads, or some primitive gear cutting equipment. Operating these machines, were, almost exclusively, trained mechanics capable of operating any machine in the shop, each selecting speeds and feeds to the best of knowledge and judgment, generously using the "squirt can" to lubricate the machine and carefully operating the machine to avoid spoiling of the work, damage to the machine, or accident to himself.

Environment Changed

The parts thus produced were made after drawings, but tolerances and fits were left to the sound judgment of the operator. In the same shop of those days, we found rows and rows of benches on which fitting and some other operations were performed manually. The mechanics of those early days are in many cases the pioneers of the machine tool industry.

Instead of the relatively few types and sizes of standard and conventional machine tools, we find today standardized, semi-special and special machine tools in an undreamt of variety and a great multiplicity of sizes to meet modern requirements, and in some cases the fancy of the individual user. The operator serving these machines is generally not the all-'round mechanic of the earlier days, but a specialist trained to handle this particular type of machine, and quite often to produce only a particular type of work piece. The machine itself with its powerful drive, its simple or complicated tooling and intricate mechanisms, is a Greek letter to him. The shop itself is divided into various functional elements and departments, sometimes grouped as to similar operations and other times into line production units. It is into this greatly changed atmosphere that the machine tool manufacturer supplies his product.

Tool-Room Machines Capable of Variety of Work

For the tool room where, in most cases, single pieces of any shape or size are produced, the machines must be suitably designed for producing this large variety of work pieces. They have to be universally applicable, and operable under extreme range conditions. Frequently a number of attachments greatly increase their utility. Control and operation of these types of machines are generally of greatest convenience and handiness, and modern tool-room equipment is capable of shaping work pieces to a high degree of accuracy and in very satisfactory time. Accuracy of the parts produced in the tool room is the fundamental requirement in any industrial establishment. Gages, cutting tools, boring bars and fixtures are precision instruments. They cannot check or duplicate a higher degree of accuracy than is theirs. The modern tool-room equipment with its liberal slide dimensions, its rigid frames

and its ease of operation fulfils all accuracy demands of modern industry.

That such modern equipment sometimes does not show still more favorably in regard to time-saving as compared with older models, lies in the fact that too much time has to be spent in chucking the work piece on the machine for the machining operations. Standardized chucking and clamping equipment for tool-room operations would minimize this setting-up time and with such an improvement in the tool-room methods equal benefit could be obtained with modern tool-room equipment as obtained hourly and daily with modern manufacturing equipment. The amount of energy and ingenuity which the machine tool builder has put into development of this type of equipment should be met with more constructive response and cooperation from the user in the full utilization of its productivity.

The inventory statistics published in the *American Machinist* on metal-working equipment, or machinery particularly used in the tool room show that replacement of such equipment has not been anywhere near in line with replacement of equipment for manufacturing purposes. Analysis of the possible machines used in tool rooms from these inventory statistics indicate that more than 75 per cent of the equipment in tool rooms is over 10 years old—certainly not an equivalent with the tremendous development which has taken place in the design of this type of machine tool.

Production Equipment Design and Building a Problem

The *American Machinist* inventory of metal-working equipment indicates that 65 per cent of practically all the machine equipment in this country is over 10 years old having increased from 44 per cent in 1925 and 48 per cent in 1930.

While unquestionably the years of depression have retarded the replacement of antiquated equipment, it can positively be stated that such a standstill in development of production machinery has not taken place. The design and manufacture of such production equipment is one of the biggest problems the machine tool builder faces today. He is asked to build machines for the tool room which also frequently have to be used for small quantity manufacturing. The ease of manipulation and setting-up of such machines makes this type of equipment especially suitable for this class of work. The machine tool builder is further asked to build machines for quantity manufacture of medium or high production and it is natural that such machines have to be different from the general utility machines. They should have a semi or completely automatic cycle, and the work of the operator should be confined solely to the chucking and unchucking of the work.

In addition to these two types of machines which normally are standard and can be produced on a quantity manufacturing basis, the machine tool builder is asked to build high production machines of a semi-standard nature; that is to say, machines which are partly made of standard units and in part of special mechanisms to meet individual requirements. He also has to build high-production, semi-special tools, which are machines of special design but using a few standard components, and finally he has occasionally to meet requirements for completely special machines.

From One Extreme to the Other

The demand for these various types of machines did not develop in the order mentioned; on the contrary, it was in a jump from one extreme to the other. When industries started to get on a large manufacturing basis, they departed from the standard machine tool and saw their only salvation in the highly specialized machine. These machines, however, had and have the disadvantage of being designed for a specific operation and to produce a specific part only, and they become obsolete as soon as a change in the part for which they were designed takes place.

To overcome this problem, standard high-production manufacturing machines were developed and their design being lately of the unit type construction has made possible the assembling of various of these units into different components with the result that semi-standard machine tools or semi-special high-production tools can be produced today composed to more or lesser degree from standardized units. Their productivity compares satisfactorily with the special machines above mentioned.

Requirements Studied

It is hardly necessary to call attention to the amount of study and of development cost the machine tool builder is put to in solving the problem here discussed. Years of practical experience in combination with a thorough field study are necessary to obtain a true picture of the requirements of the various industries into which the proposed machines have to fit, and the design of such machine and components multiplies problems and costs.

The machine tool manufacturer in any particular line has to serve the various industries, one dealing with small integral parts such as typewriter, sewing and adding machines; a second one producing as he himself generally does, medium-sized parts like the automobile or electrical industries; and finally the industries which make the large parts such as railroad equipment, printing presses, power plant equipment, etc.

Thus, even if the machine tool builder confines himself to a limited line of products he has to manufacture machines in a relatively large number of styles and sizes to meet the demands of his customers. To obtain a picture as to what extent various types of machine tools have developed we might mention here that more than a dozen different

ON the opposite page, we take pleasure in presenting to his many friends in the metal-working industry August H. Tuechter, president of the Cincinnati Bickford Tool Co.

This week marks the fiftieth milestone of Mr. Tuechter's business life, and we wish him many happy returns of the day.

AUGUST H. TUECHTER, Drawn by John Frew for The Iron Age

types of lathes, some 15 different types of milling machines and over 20 different types of grinding machines are produced today in this country by various manufacturers, and that practically all these various types of machines are built in multiple sizes. Every year brings such new machines on the market, and new methods and applications add continuously to this large list of machines. The life of a design of these individual machines has for various reasons become shorter and shorter which results in the tremendous and costly problem of keeping his machines up to date. Add to this the development and utilization of new mechanisms such as electrical and hydraulic controls, and you have a picture of one phase of the problem that the machine tool builder has to meet.

Improper Care a Problem

Another serious problem which the machine tool builder faces indirectly is the improper care of machine tools in a large number of shops. Machine tools produce chips and often use cutting coolant; during the cutting operation these chips are spread not only over tables and slides, but also over other parts of the machine. It is astonishing indeed, how little care is often exercised by the operator and shop management in keeping these machines clean and thus not only maintaining the intended accuracy in the performance, but also avoiding problems in the form of break-downs, blame for which frequently is put upon the shoulder of the machine tool manufacturer.

Machine tools are in general precision machines. To maintain the accuracy of machines and products, adjustments of tool and work supports is occasionally required. Such adjustments are provided in most machines, but they are too often utilized only after damage is done to tool or work.

Machine Tool Builder a Consultant on Tooling

The modern machine tool manufacturer is the consulting engineer of industry in its various tooling problems. In the years gone by if an industrial establishment needed a machine tool they made their own selection as to size, style and make, and the deal was closed. Today with the tremendous specialization in the machine tool, the production department of a plant sends the part, or a drawing of the piece to be machined, to the various machine tool manufacturers and asks them for recommendation as to the best methods of machining. Industry thus obtains from the machine tool builders, expert opinion on their production problems and avails itself of this free service. This service not only requires a thorough study of the individual operation involved, but also comparative time studies of all possible methods, a consideration of fixture and tool problems, and in a large number of cases a study of the piece to be machined as to its possible resistance against strains, and of its possible behavior during and after the cutting operation. Selection of the most advantageous material for the cutting tool, such as high-speed steel, stellite or tungsten carbide, is another concrete problem. And finally the method of holding and clamping the work piece requires considerable study. Mechanical, pneumatic or fluid pressure clamps are available and the production requirements, as well as the nature of the work and the type of operator, must dictate their proper selection.

The design of fixtures and cutting tools involves not only such considerations, but also complete information as to stock to be removed and, of course, the nature of the material of the work piece. Variance in either of these factors might be detrimental to the satisfactory performance of the intended equipment. Quite frequently also the performance of certain operations on a particular type of machine might simplify or eliminate certain previous operations, and it is therefore sometimes difficult to get a true picture of the problems involved. These are just some high spots of the free service the machine tool builder is called upon to give.

Benefits from Cooperation

Quite frequently the design of an individual part to be machined does not lend itself at all, or only with certain limitations, to a particular machining operation on a specified type of machine tool. It is the sad experience of every foundryman that the castings designed can only be molded with considerable difficulties, if at all. This is due to lack of knowledge of foundry practice of the designer.

A similar lack of shop experience lets the designer produce pieces which can be machined only under great difficulties or not at all, on certain advanced types of machine tools. The average designer, although he might have had shop experience in his early days, has not kept himself fully versed with the development of new methods and new machines. Sometimes a change in the design of the part in question is suggested by the machine tool manufacturer to make it applicable for machinability on his product, and sometimes such suggestions are gratefully received. Quite frequently, however, a number of reasons make such a change in design at such a late date undesirable or unpracticable, and work is continued to be produced by a less advanced method because the usefulness, utility and applicability of the modern machine tool was not known or was not thoroughly understood and appreciated. In this respect, closer cooperation between machine tool builder and the engineering staff of machine tool users would be of mutual benefit.

Tightening of Tolerances Adds to Builder's Problems

As stated previously, in olden times tolerances and finishes of individual parts were left in most cases to the expert judgment of the machine operator or the foreman. Today we have in every modern shop quite an elaborate system of tolerances for the various fits, and besides, considerable attention is paid to the desired surface finish of parts. We specify tolerances and limits on our drawings and the trend of these tolerances is continuously toward closer limits. Interchangeability of parts and closer uniformity of product makes such narrower limits desirable. Such closer tolerances not only eliminate in some cases hand fitting where, due to the nature of the mechanism, close fitting elements are required, but it also gives better working performance of individual parts. A machine produces naturally more uniform work than can be expected from manual manipulation of the tool by the operator. Needless to say this tightening up of tolerances puts additional burden on the machine tool manufacturer in designing and building machines capable of producing such close tolerances.

Example of Precise Work

What has taken place in this respect in the manufacture of some of

the parts might best be illustrated through a practical example. When our company first introduced centerless grinders, tolerances of piston pins were ½ of one-thousandth of an inch. The possibilities of these centerless grinders in producing more accurate work on a manufacturing basis made the automobile manufacturer reduce these tolerances first to ¼ of a thousandth of an inch, and 4 or 5 years ago to 1 ten-thousandth of an inch. Today piston pins are lapped on the centerless lapping machines at a rate of 30 to 40 a minute, depending on size, and with the tolerance of ¼ of one ten-thousandth of an inch as to roundness, and the tolerance of ½ of one ten-thousandth of an inch as to straightness and size.

Having now the possibility of producing the piston pin to such high degree of accuracy, the automobile industry demands that the corresponding hole in the piston be produced to somewhat similar tolerances to get the full benefit of such precision work. The latest development in high-speed precision boring machines has solved this vital problem of close fitting piston pins for the automobile industry. This illustrates the close and interwoven relation between various types of machine tools in producing parts or units to meet modern requirements of industry at large.

Similarly, with this tightening of tolerances has come a trend and demand for better control of surface finishes. Various standardization committees, sponsored by the A. S. M. E. and other national societies, are working today toward standardization of surface finishes and means to determine and inspect such surfaces. When these standards are once established it will, no doubt, put additional burden and problems up to the machine tool manufacturer, whose product is called upon to produce these required surface finishes.

The problem of standardization of machine tools and machine tool elements is a very intricate one. For many, many years the milling machine manufacturers have standardized the ranges of their knee-and-column type machines. When this standard was first introduced, a No. 2 plain milling machine had a table travel of 28 in., a cross travel of 10 in., and a vertical travel of 19 in. The competitive machines in the No. 2 sizes were, as far as capacity and capability of producing parts are concerned, somewhat equal; but even in this standardized range of today, we find milling machines of the No. 2 size with motor rating and general dimensions varying as much or more than 100 per cent. Machines of this variance are built by the same manufacturers, thus multiplying the design and manufacturing problems.

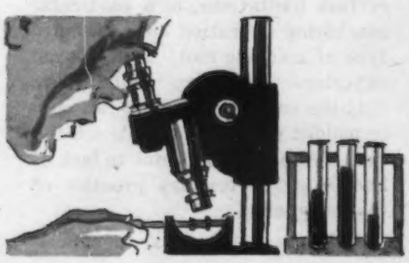
Attempts have been made repeatedly to standardize designation and ranges of machine tools by the standardization committee of the A. S. M. E. and other national societies.

Research Conducted by Machine Tool Companies

Like other modern industrial establishments, the modern machine tool plant has its own research department for the investigation of the particular problems involved in its specific line of product. The size and the progressiveness of the individual company are the determining factors as to the extent that such research work is undertaken. To the modern machine tool manufacturer many problems and new ideas are brought from within and without, and thorough investigations are necessary to determine utility and usefulness of such ideas. Through this research of the individual machine tool manufacturer, contributions have been made to the art of metal cutting which generally is contributed unselfishly to the public.

Metal Cutting Studies

The progress made in the art of cutting metals in spite of all these activities—and such activities are by no means confined to the machine tool industry—is very slow indeed. When, more than 30 years ago, high-speed steel was introduced as a metal for cutting tools, the machine tool industry welcomed this new cutting material and made their machines applicable for utilizing these advanced cutting tools.



It is frequently the experience of every modern machine tool manufacturer that change of cutting or rake angles or change in the design of the tool will materially improve the functioning of the machine, increase its production, improve the finish of the work piece, and prolong the life of the cutting edge of the tool. When we experience such results, even after we have known these cutting materials for 30 years, it is quite natural that our troubles with the subsequently developed cutting materials are multiplied many times. This is due in part, at least, to the fact that today we have a very meager knowledge of what takes place at the cutting edge of a tool.

Results from United Effort

Excellent research under varied conditions in the form of cutting tests has been made and published. While these tests have contributed much to our practical knowledge in the design of cutting tools for certain purposes, it is safe to say that millions of dollars annually could be saved if we would but have a thorough knowledge of what takes place when a chip is produced and of the conditions under which we could produce this chip most efficiently. These problems cannot be solved by an individual machine tool builder, or by the machine tool industry at large, nor can they be solved solely by the research work of individual university laboratories, whose cooperation in this respect we welcome and appreciate. Ultimate results can only be obtained by a mutual and united effort on the part of the machine tool industry, the laboratory worker, and industry at large. Either through the A. S. M. E. committee on metal-cutting or through some other committee a fixed definite plan of research should be worked out, and the necessary steps to be taken adequately to approach this subject decided upon. Such a report with data of possible costs should then be presented to men of influence in industry for the purpose of obtaining the necessary funds to proceed with this research work. Presented in a convincing way and by the proper men, American industrialists are far-sighted enough to see in such research work an investment which would pay big dividends.

Late Returns from Laboratory And Mill

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By T. W. LIPPERT
The Iron Age, New York

o o o

AN English concern has announced a new type of gas designed specifically to take the place of acetylene, particularly for cutting work.

Likewise in England, a rust-preventing treatment for large structures has been developed, and a group of experimenters has just completed an investigation to determine the most reliable manner in which to determine the capacity of metals to withstand pressing and stamping operations.

A German company is marketing a liquid to supersede lime in the drawing of wire, and an Italian concern has patented a straight-line relief feature for cutters and hobs.

In this country a new plating anode and a new transparent acid-resisting frit are being marketed; also, a note is contained herein as to the current practice of the Navy in soldering all pipe joints.

o o o

Oxy-Ferrolene, a New Cutting Gas

IN the past few years a variety of gases has been developed for metal cutting purposes, but the use of each particular gas has been generally limited to specialty operations as against the more universal usage of oxy-acetylene equipment. In England, at the present time, a new gas is being sold under the name of Ferrolene, and a multitude of advantages are claimed by the patentees. This new gas is essentially ordinary coal gas impregnated with a vapor of a liquid (nature not revealed), the resultant mixture being used in place of acetylene. When mixed with oxygen, this Ferrolene burns at a temperature of 5000 deg. Fahr., as compared with 3300 deg. for coal gas and 5450 deg. for acetylene.

The makers claim that Ferrolene gas has no explosive tendencies, that it is not injurious to the eyes inasmuch as the flame is non-incandescent, and that there is no residual sludge. In comparison with acetylene, it is claimed that the speed of cutting is about equal, the cuts are narrower and the cut surfaces are not oxidized. The phenomenon that occurs when the vapor of the liquid is mixed with coal gas is (1) the ignition point of the gas is lowered, (2) the propagation of the flame is retarded, and (3) the intensity of the flame is increased.

In England this gas has been used to some extent in scrap and shipbreaking works; it can be employed in plants burning lead, for brazing or annealing, cutting risers in foundries, welding light-gage metal, and for use instead of hydrogen in the manufacture of hard glass such as Pyrex.

Rust Prevention for Structures

SHERARD COWPER-COLES, of England, the inventor of Sherardising, has just applied for world patents on a new zinc-coating method of preventing rust which is particularly applicable to large structures, such as bridges, trains, trucks, gas containers and ships' steelwork.

No special preparation of the surface, other than that usually given before painting, is required for the new Duraspray finish. A priming coat of special composition is applied. While this primer is in a "tacky" condition a stream of finely divided metallic powder is driven upon it by compressed air apparatus designed for the purpose and so arranged that a perfectly even and closely packed metallic layer is formed. Afterward a finishing coat of paint of any desired color is applied. The final appearance is thus the same as that of painted work, but the important feature of the combined protective coating is the separate layer of metal that lies between the two coats of paint.

The metallic layer is protected

from the atmosphere by the finishing coat, but when abrasion occurs the metallic layer is at once exposed. As it is electro-positive to the steel, a galvanic couple is set up (in the presence of moisture) which causes the steel to be preserved at the expense of the metal coating. In the course of time the latter suffers, but meanwhile it strongly resists the underspread of corrosion.

Fluid Pressure Cupping Test Is Recommended

COLD pressing and stamping are operations which have constantly increased in industrial importance in the past decade. Because of their current prominence, it is of importance that attention be given the methods of testing sheet materials as to their suitability for a given pressing operation. To test this suitability some form of "cupping" test is usually employed, although such tests are often employed only to confirm tensile data previously obtained.

Feeling that the many forms of mechanical cupping tests can be improved, the Institute of Automobile Engineers (English) has just completed an extensive investigation all to the end of developing a more reliable and informative cupping procedure. The Erichsen, Guillery, Olsen, Amsler, and Avery machines all operate on practically the same principle, but uncertainties of the contact of the distending tool and the variable degree of friction often result in questionable data.

The institute has thoroughly examined the Jovignot method, which has no contact point or mechanical friction, and has presented data purporting to show that this test may even be superior to tensile testing. In the Jovignot method the specimen is firmly clamped in annular steel grips and is deformed into a dome by means of fluid pressure applied to one side of the sheet, as shown in Fig. 1. Rupture finally occurs as the result of the pressure and deformation; the height of the dome and fluid pressure may be observed and thus an indication of the ductility is obtained. It is apparent that the ductility of the specimen in all directions is tested, whereas the tensile test gives the ductility in only one direction. The fracture of the specimen in the Jovignot machine generally occurs by splitting at or near the top of the dome. The shape and direction of the fracture are useful indications of the directional properties of the metal. Materials believed to be equally strong

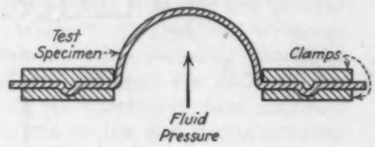

FIG. 1—The Jovignot fluid-cupping test. Oil pressure forces the test piece upward into a dome. The dome height and fluid pressure give an indication as to the suitability of the material for pressing and drawing.

in each direction often exhibit curved lines of fracture or fractures inclined to the rolling direction when they are burst in this fluid cupping test.

Transparent Acid-Resisting Frit

EVERY manufacturer of enameled products has occasion to process enamel so that the surface will stand up during long contact with acids or corrosive fumes. This is particularly true for stoves, refrigerators, etc., where resistance to food acids is desired, and for signs that are subject to the ravages of weather, which are particularly severe in industrial locations where the atmosphere is laden with acid-forming gases and chemicals.

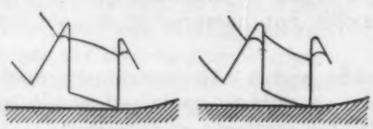

FIG. 2—Straight-line relief (left) of cutters and hobs has been developed to avoid the tendency to rub of the conventional curved relief tool shown at the right. Patents on this innovation are held by Challier of Turin, Italy.

The O. Hommel Co., Pittsburgh, has developed frit No. 924 which is very clear and transparent and, in addition, is said to be more acid-resisting than any commercial frit so far tested. Because colors are used to such a great extent in outdoor signs, this new transparent frit is believed to have considerable potential usage for protecting this type of porcelain enamel.

Eliminates Lime Dipping During Wire Drawing

THE new Molco process of neutralizing acids in the pickling of wire, tubes, bright bars, strip and sheets is receiving considerable attention from foreign makers of these products. Moll & Co., of Mülheim, the Ruhr, Germany, hold the patents. This process is said to eliminate the need for lime dipping during wire drawing and similar work.

The conventional lime dipping method is used to neutralize acid left on materials after pickling and also to create a coating necessary for subsequent reduction through dies. This coating, however, often interferes with the effect of lubricants used during the reduction. Likewise it also tends to become porous and has such an affinity for moisture that repeated stoving of the material is necessary.

The Molco process is said to overcome these drawbacks. The bath consists of a powdered preparation mixed with water in specified quantities. The coating left on the material is thin, transparent and, being non-hygroscopic, does not necessitate the use of drying ovens. The bath is used cold, pores and pitting are avoided, and the surface condition of the metal can be seen because of the transparency of the coating. The material may lie for several days without deteriorating; therefore, large quantities can be treated at one time and put into stock for subsequent working.

This material apparently is superior to the use of silicate of soda and tri-sodium phosphate, which also have been advanced as substitutes for lime coating. The soda-phosphate bath gives troubles traceable to hydrogen embrittlement arising from the pickling; coils of small-gage wire do not coat properly, and excessive die wear occurs.

Navy Solders All Tubing

THE United States Navy is now soldering all non-ferrous piping and pipe fittings, and it has been stated that this "new" pipe joint offers certain marked advantages to naval construction. American standard pipe walls are doubly thick—the first portion being selected to withstand internal pressure and corrosion, and the second portion to permit threads of proper depth and to provide somewhat for external corrosion. By substituting a soldered joint for a threaded one, the second portion of the standard pipe wall can be eliminated and a

(CONTINUED ON PAGE 110)

Ford Granodizes Lamp Shells As Protection Against Rust

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By BURNHAM FINNEY
Detroit Editor, The Iron Age

o o o

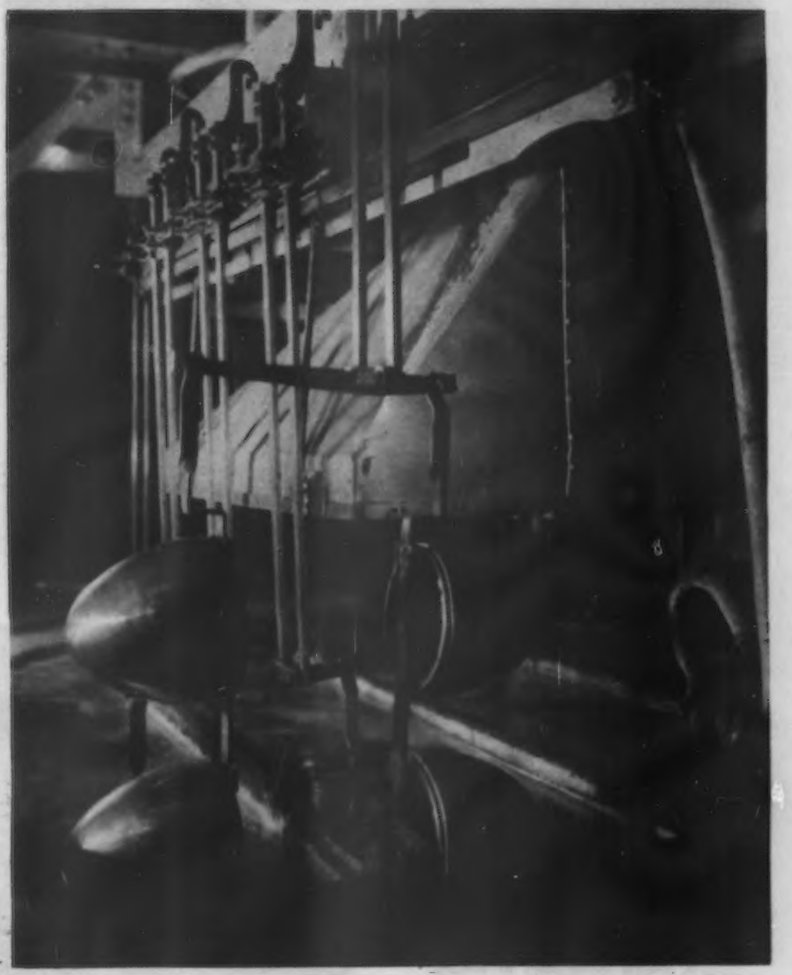
AS a permanent protection against rust, the head lamp and tail lamp carbon steel shells for V-eight cars are being put through an electro-granodizing process prior to being enameled at the Flat Rock, Mich., plant of the Ford Motor Co. This process results in a crystalline deposit of zinc phosphate being made on the surface of the metal, thus providing better adhesion of the enamel to the steel and, in case the enamel coating is scratched or broken, preventing corrosion at the break and also in the area surrounding the exposed portion.

In the electro-granodizing process alternating current received from power lines outside the plant passes through a special transformer known as a "granodizer." Lamp shells are energized with a current density of 35 to 40 amp. per square foot of surface, a protective film 0.0005 in. thick being deposited on the metal. The granodizing solution is made up from a proprietary chemical which forms a special phosphate coating on the cleaned metal.

Processing Automatic

Equipment used to apply the granodizing process is similar to that for cadmium or nickel plating. It is entirely automatic in operation, the lamp shells being hung on racks on an endless chain overhead conveyor which carries them through the various steps. Current is supplied the granodizing tank by means of bus bars. Lamp shells are lowered into the granodizing solution, where they remain for 4½ min. The temperature of the solution is 150 deg. F. When the shells emerge, they are rinsed in a cold water spray and then are dipped in a hot water rinse.

When the lamp shells reach the end of the granodizing process, they are so smooth and clean that no sanding operation is necessary. They are wiped by hand with a tack rag and are dipped in the primer coat of enamel. Before they are granodized, they are wiped with a damp rag containing mineral spirits. Incidentally, after the steel lamp shells are drawn to the desired shape in four successive press operations, they are washed



EQUIPMENT used for granodizing is similar to that for nickel or cadmium plating. Lamp shells, hung on racks on an endless chain overhead conveyor, are automatically carried through the various steps.

in an alkaline solution and are ground on special automatic machines before being granodized. The grinding operation removes stretcher strains and other inequalities in the surface of the metal.

Tests made by the Ford Motor Co. on bare metal which had been granodized showed that it is highly rust-resistant. In accelerated salt spray tests, for instance, the granodized steel stood up for many hours before corrosion set in. Lamps finished by enameling the granodized steel will stand 500-1000 hours' exposure to the salt spray without rusting or lifting of the enamel around cuts or scratches which penetrate into the underlying steel. By means of the granodizing process, Ford has increased the life of the finish and eliminated the possibility that lamp shells, through accidental scratching of the enamel, may become pitted with rust spots which mar the appearance of the car and are injurious to the metal. The process, because of the crystalline deposit on the steel, likewise makes the enamel cling tenaciously to the steel, the close adhesion of the enamel and the steel preventing further breakage of the coating.

The electro-granodizing process, which is a new development, can be applied as a protective coating for steel where enamel, lacquer or synthetic materials are to be used as a finish. It can be specified for small parts, such as bolts, nuts and lock washers, where a rust-resistant surface is desired. In such cases it sometimes is applied by using tumbling barrel equipment instead of large conveyorized tanks.

ABOVE

MOST motor car manufacturers buy their tubing for exhaust pipes, gas tank filler pipes, etc., but the Pontiac Motor Co. has its own continuous tube mill through which a strip of flat stock is fed, formed into the required size and welded by a huge revolving copper welding electrode. Any size of tubing from ¾ to 3 in. can be rolled with only the change to the proper set of shaping fixtures. At present Pontiac is rolling three sizes of tubing.

BELOW

MANUFACTURE of Chevrolet's wire wheels, at the company's Detroit plant, is done almost entirely by machinery, much of it automatic. The one most important operation performed by hand is the inserting of wire spokes that connect the rim and the hub. It is a job that requires painstaking attention, and skilled workers perform the job with a deftness and speed that amaze visitors.

Standards for Foundry Apprenticeship Adopted by A. F. A. Committee

THE apprentice training committee of the American Foundrymen's Association, cooperating with a similar committee of the National Founders' Association, has adopted and published "Standards of Four-Year Foundry Apprenticeship." The American Foundrymen's Association committee work will be followed up by a session on this subject, which will be held at the Toronto convention of the association, the week of Aug. 20.

The standards suggest that management should have a sincere conviction that apprentice training is necessary to the successful conduct of the business, and be ready to act accordingly. Every foreman should be taught to share this view and understand that apprentices will require special consideration. Selection of apprentices should be made in the light of some practical method for determining whether or not candidates for foundry apprenticeship are interested in foundry work.

The age of boys should be not less than 16 years at the time of entering upon their apprenticeship, and all boys selected should be physically capable of pursuing the trade. An eight-grade education, or its equivalent, should be required of all candidates. There is no place in foundry apprenticeship for experimenting with subnormal boys. The term of apprenticeship for young men who have the equivalent of eighth-grade schooling should be four years. The terms for young men with additional schooling should be shortened in proportion to the extent of the schooling.

Schedules of advancement in both work and pay for apprentices should be prepared in advance, and a sincere effort should be made to hold to these schedules during the training period. Apprentices should not be used for work which is ordinarily assigned to common laborers and which has no training value. The four-year schedule, however, should be divided between the major departments of foundry experience and related instruction.

The following general schedule of advancement is recommended:

Helping molder—three months.
Bench molding—four months.
Machine molding (squeezer, jolt roll-over, sandslinger, etc.)—six months.
Floor molding—four to 12 months.
Dry sand molding—two months.
Core making—six months.
Cupola or furnace practice—three months.

The remaining portion of the apprenticeship course shall be spent on various operations such as the management believes to be in the interest of both training and plant economy.

Related instruction should include at least four subjects: mathematics, drawing, science and economics and related foundry technique. The proportion of time spent should be approximately as follows: mathematics, one; drawing, one; science, one; economics, one; related foundry technique, one and one-half. Classes should be held weekly and a four-hour class period is suggested.

Apprentices should be regularly indentured—that is, they should be required to sign an agreement which is signed also by the employer. The agreement should include at least the following items:

A. The date of the signing of the agreement.
B. The names of the parties to the agreement.
C. The date of birth of the apprentice.
D. The residence of the apprentice.
E. A statement of the trade which the apprentice is to be taught.
F. The number of years to be spent in training and the number of hours to be devoted to classroom training.
G. The date on which the period of apprentice training is to begin.
H. The number of months, weeks or hours to be devoted to work in the major divisions of the trade.
I. A statement by parents or guardian that "As parent or guardian, it is agreed that the said minor shall diligently work for and serve as an apprentice in the employment of the said party of the first part during the full term of his apprenticeship."
J. A statement that the employer will engage the young man as apprentice and teach him the trade in question.
K. A statement of the minimum compensation to be paid apprentices, as well as a schedule of advancement in pay.
L. A statement that a certificate will be given to the apprentice upon his having concluded his apprenticeship in accordance with the terms of the indenture.

If the program of apprenticeship is based on a frank consideration of the company's need of apprentices and on what it can offer

ONE of the legacies of the depression is an accumulating shortage of skilled mechanics. Many skilled workmen have been lost to industry because of age or death, and business conditions have not been such as to provide opportunities for new men to step into their places. The need for apprenticeship training has become acute.

Therefore the adoption of tentative standards for apprenticeship in the foundry industry is timely. The standards outlined in this article will be the topic of a session at the convention of the American Foundrymen's Association at Toronto, the week of Aug. 20.

to attract the right kind of young men, then it can be expected that relatives of employees will make application as soon as they become aware of the intention of the employer to take on apprentices. In gaining public recognition of apprenticeship, cooperation with grade schools and high schools is of great importance. Special effort should be made to interest the parents of apprentices and prospective apprentices.

What to Look For in Applicants

In considering an applicant for apprenticeship, it is most important to determine if he has the right motive in making application, that is, whether he is really looking for training in the trade or merely looking for work. The boy's adaptability for the kind of work that he wants to do can best be ascertained by a trial period of actual work at the trade. For this reason, the first three months of apprentice training are ordinarily made a period of probation. In selecting applicants for apprentice training it is important to have information regarding his character, his honesty, diligence, reliability and other qualities which are important in filling any position whatever.

The indenture is a proof of the employer's sincerity and destroys any suspicion that the apprentice may be exploited. A copy remains in the home and constantly reminds the boy and his parents that a course of training has been undertaken and must be completed. The signing of the agreement is an excellent test of the applicant's determination to complete the course.

Initial Reception Should Be Cordial

When the apprentice arrives for work the first time, he should be taken into the shop and introduced to the man or men for whom he will work, and to the other apprentices in the department. He should be shown where he is to work, where he may place his hat and coat, where the washrooms are, and when his first task has been pointed out, he should also be informed regarding the location of the material he will need. The first day is perplexing in any event and should be made as easy as possible for the new apprentice. On the other hand, it is a mistake to tell the boy more than he needs to know the first day, and expect him to remember it.

The schedule of work should be arranged so that it will give the apprentice opportunity to acquire adequate skill in the trade in which he wishes to try his fortune. It must be remembered that the ultimate aim of an apprentice course is to turn out skilled mechanics who can take their places anywhere in the foundry industry.

It is not necessary or even possible to follow the schedule of work in the exact order in which it appears in the agreement. This part of apprentice supervision requires a constant adjustment between work schedules required by the agreement and the need for help in the various departments of the shop. In order to accomplish the work schedule, correct records of work done must be kept.

The more variety of work which can be given to the apprentice, and the more frequently he can be changed from department to department, within the requirements of the agreement, the more easily will his interest be maintained. It is understood, however, that he must attain a certain degree of skill on each job—not necessarily perfection—before he is transferred.

Support of Foremen Essential

Foremen and other executives are the key men about whom the entire apprentice training program must revolve. Accordingly, they must be won over to apprentice training before the work is begun, and their interest and enthusiasm must be constantly maintained. Foremen and executives need to be reminded of their teaching functions in an apprentice training program, and much of the credit must be given to them if the program is successful.

Sometimes boys who are genuinely interested in their trade do not appreciate the importance of school work. It should be pointed out to the apprentice that a trade is a combination of knowledge and manual skill, and that shop work alone will impart the manual skill only, leaving the apprentice ignorant of the theoretical side of his trade and only partly equipped for his work.

Class work can be made interesting by means of concrete and specific rather than abstract instruction. Examples and illustrations having reference to the trade work should be constantly used. A record of grades and school work should be kept for each student in connection with a record of his shop work and the improvement or retrogression should be pointed out from month to month. The value of these grades will be increased if a report of them is sent regularly to parents or guardians.

Course Should Be Comprehensive

Lessons should be laid out so as to cover completely the entire field of instruction which the apprentice course requires. Lesson material has been prepared by various associations and agencies interested in apprentice training and, if there is a local vocational school, first-class service in this direction may be expected from its authorities. This in no way decreases the need for cooperation between school and shop in adapting material to the peculiar requirements of local conditions.

The first instruction can be presented to the apprentices as a group. Individual tendencies need not be considered except insofar as they are expressed through questions asked by the apprentice.

Schedule of Classes Should Be Flexible

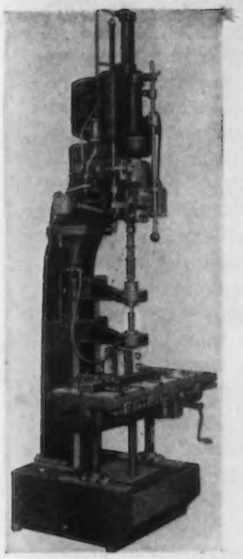
School attendance should be arranged so that it will interfere as little as possible with the regular routine of the shop. The apprentice instructor will gain nothing by insisting that a certain apprentice attend school at the scheduled time if he is working on a rush job, when his school attendance may just as well be postponed to another day. The appreciation of a fair-minded shop official for this adjustment will strengthen the program. Shop officials frequently notice that certain apprentices are deficient in decimals or blueprint reading, or some other branch of instruction. When reports of this nature are made, the supervisor should make arrangements for special coaching in those subjects in which the apprentice is deficient.

It is important that apprentices become acquainted with each other and with the shop management, as far as possible, as the time will come when such acquaintance will be necessary for them to cooperate properly with the various officials

(CONTINUED ON PAGE 99)

SELF-OILING, ALL-GEARED

Internal Honing Gives You 3 Profits



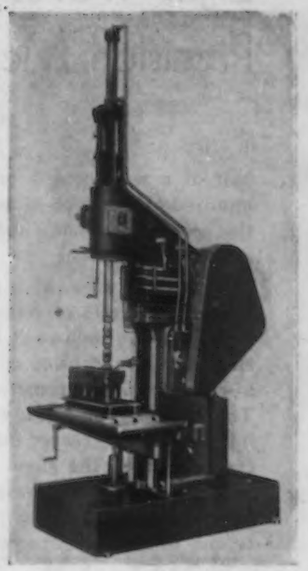
Above—No. 194 Honer, with patented electric stroke counter. Unexcelled for finishing bores from 5/8" to 4" diameter, and for lapping smaller holes.

ACCURACY—Self-Oiling, All-Geared Internal Honing gives you a higher degree of accuracy than can be obtained by any other method, and at lower cost. Holes are truly round, straight from end to end without "bell mouth" or "barrel," accurate in size within .0002" on the smaller diameters and .001" on the largest.

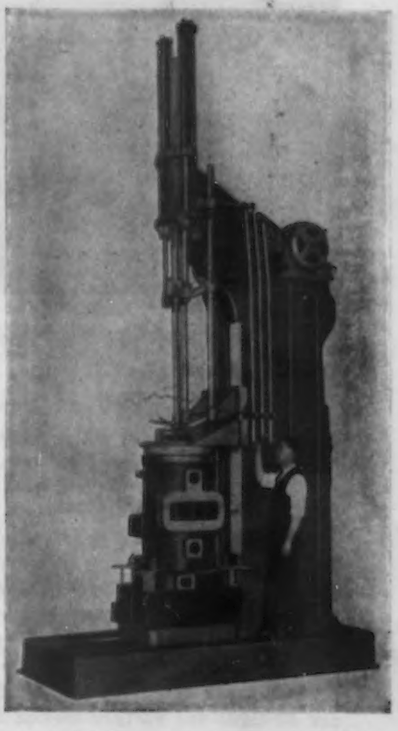
PRODUCTION—This method gives you higher production in less floor space with a smaller number of operators than other methods of bore finishing.

FINE FINISH—The surface created by Internal Honing is either satin smooth or like a mirror, as desired. It saves running-in time, improves quality and operation of the product in which it is used, adds powerful selling features.

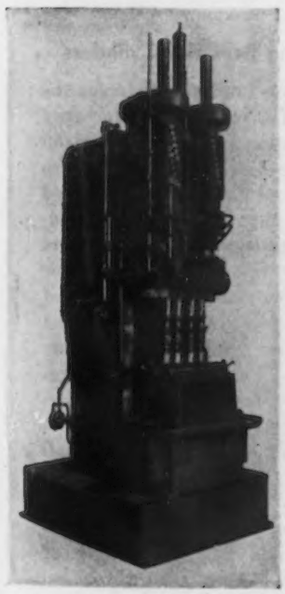
Self-Oiling, All-Geared Honing gives you three profits—greater accuracy at low cost, increased production in small space, a finer product with added selling features. Investigate!



Above—No. 249 Single-Spindle Honer with quick-change speeds. Has 16" stroke, hones to 8" diameter.



Below—No. 214 Multiple Spindle Honer for finishing 2 to 8 cylinders simultaneously.



At right—No. 3620 Honer for finishing large Diesel engine and other cylinders up to 20" dia. by 54" long.

SEND FOR BOOKLET — Our illustrated booklet entitled "The Honing Process" contains much valuable information. Write for a copy today. Address department I.

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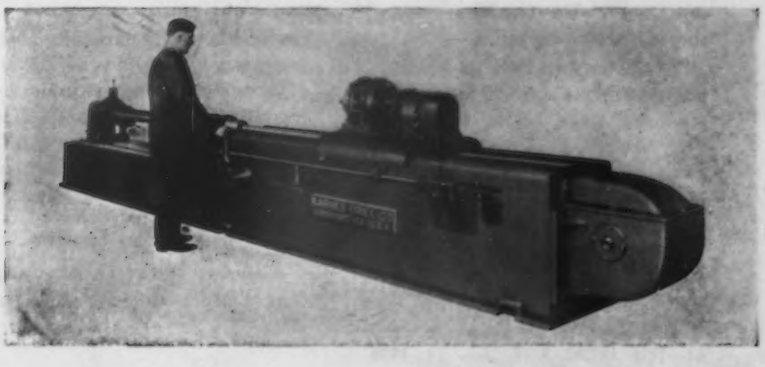

At right—No. 5 Horizontal Honer, for reducing cost of finishing bores that have hitherto been difficult to machine to desired accuracy. Also available in two larger sizes.

Light Waves in Precision Measuring

(CONTINUED FROM PAGE 15)

half of a wave length or one one-hundred thousandth of an inch, at the second, two one-hundred thousandths, and so on.

With light waves it is as easy to measure in units of hundred-thousandths of an inch as it is to measure in thousandths of an inch with a machinist's micrometer caliper. The accuracy of light waves is a hundred times greater than the micrometer with the same degree of care and skill. Futhermore, as the experienced machinist estimates tenths of graduations with a micrometer, the user of light waves estimates in millionths of an inch.

FIG. 7—In making the complicated optical systems of military range finders, errors exceeding a millionth of an inch are serious matters.

Checking Gage Blocks

When an optical flat is placed on a gage block and viewed in monochromatic light, secured by passing white daylight or electric light through a red silenium glass screen, light and dark interference fringes or bands are seen. If the bands are straight the surface viewed is flat, and if the bands are curved the surface is curved.

In the comparison of a precise part, having plane surfaces, and a standard gage block, two optical flats are used. The part and the gage block are wrung on to the lower flat and the upper flat is held securely touching the top of both the part and the gage, shown in Fig. 3. From the position, direction, and spacing of these lines, the exact amount that the part differs from the standard can be determined in millionths of an inch. In sodium light the presence of each Newton ring discloses a separation of half a wave length, equal to 12 millionths of an inch.

The adherence which can be obtained between two gage surfaces through the feature of "wringing" is an excellent criterion of their flatness. A general curvature amounting to more than 0.00001 or 0.00002 in. at the center of the surfaces is sufficient to affect materially the tightness of the wring unless the curvature of the two surfaces tend to match. It is possible to wring together a number of gages with a combined twisting and sliding motion. When brought together in such a manner, it is found that the gages adhere strongly and thus form a single gage whose length is the sum of the component gages. The adherence is due almost entirely to the presence of a liquid film between the faces. This can be shown by carefully cleaning two gages with alcohol or ether, after which no appreciable wringing effect can be obtained. But the mere touch of the fingers or hand deposits enough moisture or grease to restore the wringing effect.

Liquid Film Essential

Although the presence of a liquid film is practically essential for cohesion to take place between the gages, the thickness of the film is very minute if the gages are properly wrung. A large number of measurements show that when two very plane surfaces are brought into contact in this manner the separating film is not more than one-millionth of an inch thick. If the gages have a high optical finish more intimate contact is possible, because the capillary film is thinner. Then the required separating force may range from 95 to 100 lb. per sq. in. Gages with less than half a square inch of surface area have been known to sustain a separating force of 220 lb.

The closest approach to ideal flatness and smoothness of surface is achieved in the high quality optical flat. It is very dangerous to allow such surfaces to come into intimate contact, since the molecular attraction across the interface approaches that across a plane through the solid glass and the flats tend to become one solid block. That such a tendency does exist is shown by the fact that efforts to separate two optical flats which have been firmly wrung together almost invariably result in partial destruction of their surfaces, small pieces of glass being pulled out of each face by adhesion to the opposite surface.

Measuring Balls and Cylinders

In addition to plane surfaces, the diameter of a ball or cylinder may be easily measured in comparison with a gage block. Steel balls are frequently used in tool rooms and inspection departments as standards for testing micrometers and for gaging cylindrical and taper holes. Periodical measurements of steel balls have shown a marked tendency for shrinkage to occur with age. This necessitates restandardization at frequent intervals. One method of doing this is to place a gage block, and the ball to be measured, between two optical flats. The ball serves as a taper gage, with the dark interference bands as graduations of one hundred-thousandths of an inch. With only two flat surfaces and a gage block standard any piece that is ordinarily measured between the flat surfaces of a micrometer or measuring machine may be easily and accurately measured with light waves. Another way is to choose three balls by comparison with gage blocks. These

In 1929, Monarch ran a series of ads, like the one shown above, dramatizing "Obsolescence." It aroused widespread interest and attention. It is even more important today, than then, to "Drive Obsolescence From Your Plant." Can you afford to ignore the competitive advantage and important savings that you secure when you modernize with Monarchs?

ALL DRESSED UP AND NO PLACE TO GO....

She's Out of Date!

SHE may be the town's most beautiful girl . . . and may be completely outfitted with new clothes. But, if they're out of date, her telephone won't ring often.

The lathes, out in your shop, may be comparatively new . . . they may still have years of service in them . . . but, if they're out of style in terms of modern features, your production is laboring under a severe handicap.

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Monarch Lathes
Helical Gears - Timken Bearings
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are placed equidistant around an improvised retainer and held between the flats. A larger hole in the center of the retainer holds the ball to be tested for size. Moving the top optical flat will cause the three outside balls to move if the center one is too small, but if the outside balls fail to move the center ball is too large.

The extreme precision secured with light waves may be illustrated by an apparatus consisting of a solid steel bar five inches in diameter with end supports 36 in. apart. A gage attached to the bar and an optical flat fastened to the channel iron structure above the bar serve to set up interference bands. A slight downward pressure of the fingers on the bar causes the gage to move away from the optical flat and the bands to move. It is very easy to bend the bar with the fingers to show a movement of the bands two or three times the distance between successive bands, or two or three hundred-thousandths of an inch. The bar may be buckled up or down and the change in the interference bands noted.

House Fly Bends Steel Bar

In measuring with light waves it is convenient to reckon in millionths of an inch or tenths of a unit indicated by each dark band. Thus the hundred-thousandth of an inch is ten millionths; the ten-thousandth is a hundred millionths and the thousandth is a thousand millionths. Such a small unit of measurement is hard to conceive. It may be understood better perhaps by knowing that a one-half inch steel bar projecting twelve inches from a vise is bent downward approximately one-millionth of an inch when a common house fly alights on the end of the bar.

There are many possible applications of light waves to industrial requirements and for scientific research. In the largest optical institution in America scientists bend light with utmost precision in lenses and prisms. In the precise work of making prisms for military range finders, lenses for large telescopes and high power microscopes, such a slight irregularity as a millionth of an inch is a serious matter. The right angles of prisms, whose sides are about an inch long, are machined to within one second of an arc; that is to say, were the sides of the prism to be extended, the error from the right angle would be less than a foot at a distance of 43 miles.

FIG. 6—The small circle on the millimeter scale represents the front lens of a microscope objective. It is three hundredths of an inch in diameter and its surface errors are reduced to millionths of an inch.

FIG. 8—Carl L. Bausch, vice-president in charge of engineering and research of the Bausch & Lomb Optical Co., examining a range finder prism system.

Examples of Precision

In the group of roof prisms shown in Fig. 5 is a very small prism with four polished and two ground faces, the largest dimension of which is about one-eighth of an inch. The angles are within 10 seconds of the specified values. In Fig. 6 the front lens of a microscope objective is shown. This little hemisphere is but three-hundredths of an inch in diameter and accurate in dimensions to ten-thousandths, while the surface errors are reduced to millionths of an inch.

In the manufacture of hairsprings light waves measure the width and thickness of hairspring wire as it is rolled. With the best advice available before the application of light waves about 20 per cent of the wire produced would be sufficiently uniform to give proper vibration when coiled into a hairspring. With the application of light waves the manufacturers are able to make 80 per cent of their production acceptable. Thus light waves have increased the production 400 per cent.

Such problems as the dimensional changes in dental amalgams and cements during settling, expansion and contraction of metals due to temperature of physical changes, are made easy with light waves. In hundreds of plants where interchangeable parts are made by the thousands and millions, light waves are the court of last resort in determining whether a machine tool is meeting the specifications required. Back of all the complicated machinery that whirs in industry are a few small bits of flat-surfaced glass that keep it on its course.

Bucyrus-Erie Co., South Milwaukee, Wis., has arranged an open house celebration on July 20, in cooperation with the South Milwaukee Centennial Committee. Employers, members of their families and friends will be guests at a reception and tour of the plant from 9 a.m. until noon, while from 1 to 4 p.m., the plant will be open to the citizens of South Milwaukee and specially invited guests, including customers, business executives and others. N. Rulison Knox, vice-president of the company, is general chairman of the event.

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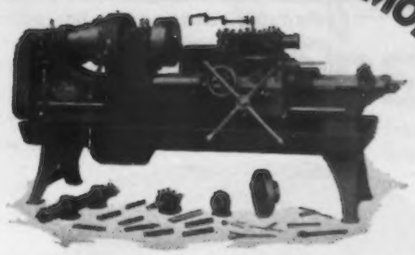

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Your future prosperity depends upon your vision now.

Cincinnati Acme Turret Lathes offer unlimited advantages in lower cost production, ease of operation and increase of output.

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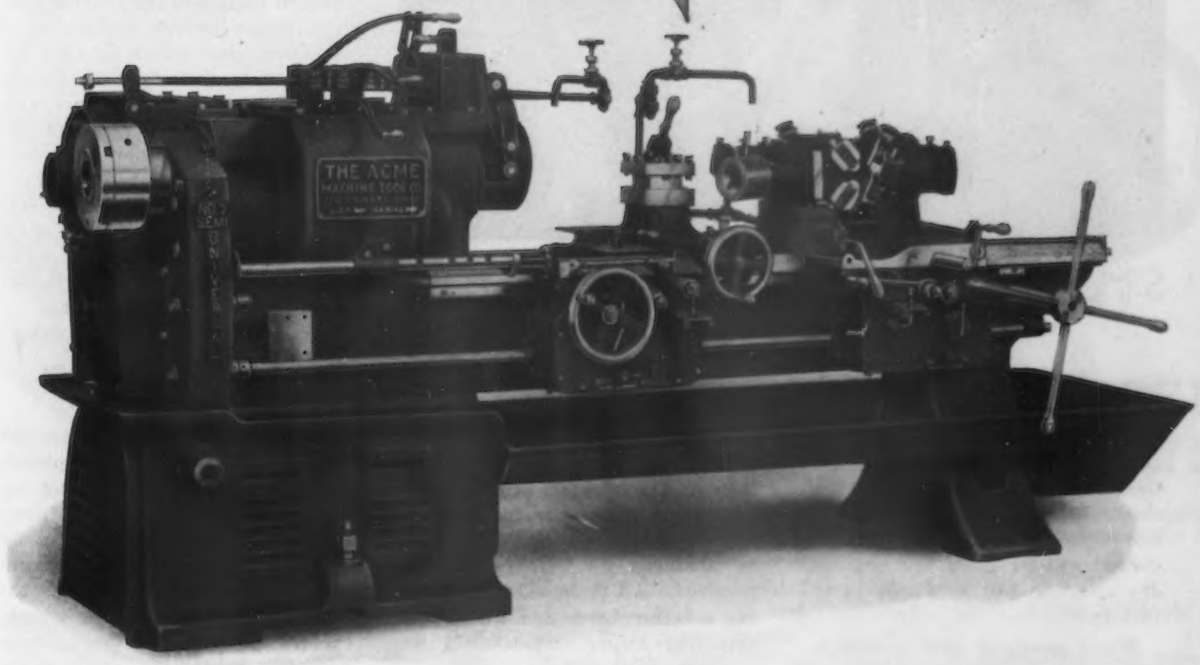


The Acme Machine Tool Co.

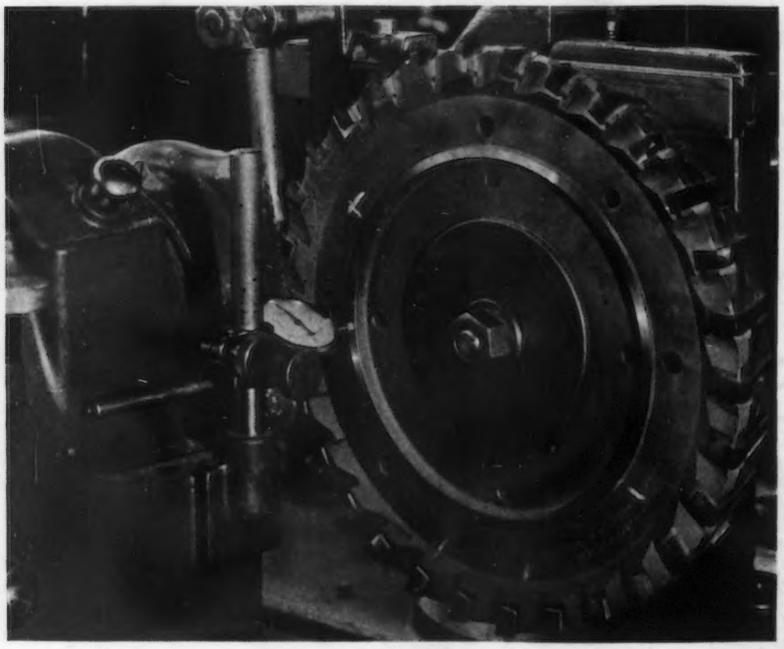
4955 Spring Grove Ave., Cincinnati, Ohio

Practical Aspects of the Maintenance Of Carbide Milling Cutters

(CONTINUED FROM PAGE 17)

The question of wet or dry grinding is determined by the class of tools to be ground. As a usual thing wet grinding is preferred for the heavier cutting or single-point tools, such as used on lathes, where excessive pressure may result in damage to the carbide tip or the brazing. For milling cutters dry grinding is entirely satisfactory because sharpening progresses from one blade to the next so that excessive heat is not experienced, but under all circumstances grinding should be either all wet or all dry for a given tool. Grinding cuts on milling cutters should be very light; if this practice is followed no heat of consequence will be generated and the dry grinding will be wholly satisfactory.

Wheel speeds of 5000 to 6000 ft. per min. are satisfactory and cup wheels of 60 grit are generally used. An 80 grit wheel may be used, but it cuts slower, and the operator by his attempts to cut fast may cause overheating by too much pressure. The 80 grit wheel is often satisfactory for finish cut purposes.



SOME mills are designed with a finish-ground ring on the front face of the body. If the locating faces are clean the cutter can, by means of an indicator, be made to indicate dead true.

Lapping Advantageous

In the manufacture or assembly of new inserted-blade cutters, it is good practice to lap the front face of the inserts before assembly into the body because this face is not supposed to be retouched when the cutter is sharpened. Lapping produces a smooth surface that helps to "roll off" the chip. Also, a smooth-lapped surface reduces the possibility of chips adhering to the faces of the inserts. Still another advantage lies in the fact that a keener, sharper cutting edge can be produced when sharpening is required. All these aid in producing a better finish and usually in obtaining longer cutter life.

After continued use, however, the lapped surface will have a tendency to break down as a result of the continued abrasive action of the chips. When this occurs, the cutter no doubt has been sharpened several times and the blades are about ready to be set out, which means the blades must be disassembled. Right here is where relapping can again be accomplished to bring the face of the insert back to its original smoothness, removing any roughness which might have resulted from use during the many resharpenings.

Operation Facilitated by Suitable Equipment

Lapping of blade faces is not difficult; in fact, it is easy if a suitable lapping plate is available. It usually requires about 1 min. or less per blade, depending upon the area of the insert face. The lap should be made of close-grain cast iron, and be about 8 in. in diameter and approximately 1 in. thick. The surface should be charged with crushed diamond dust, screen No. 4 or 5. This is done by applying a small amount of dust on the plate and pounding it into the surface with an ordinary ball-peen hammer. Only a small section should be charged at a time to avoid waste.

Charging of a new plate will require 30 min. to one hour's time and will need about one carat of diamond dust, which costs only three or four dollars. A properly charged plate will lap several hundred blades before recharging is necessary, and which in turn requires very little additional diamond dust. Incidentally, the same hammer should be used for recharging, because some dust will embed itself in the hammer face, which over a period of time will aid in producing an excellent charging tool. A lapping speed ranging from 1500 to 2000 ft. per min. has been found suitable for the general run of carbide tools.

Edge Lapping of Inserts Gives Smooth Work Finish

Lapping inserts, back from the cutting edges, after sharpening with an abrasive wheel, is not entirely necessary, yet such an operation will aid in finishing a set of blades to a high degree of concentricity, that is, insuring that all cutting edges will be almost exactly alike. This form of lapping will require an extra operation, but if unusually smooth finish on the work is of paramount importance, edge lapping will help obtain it.

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Feeds from .001"-.014" per revolution of spindle obtained from 9 change feed box.

Across the line starting and electric plug stop.

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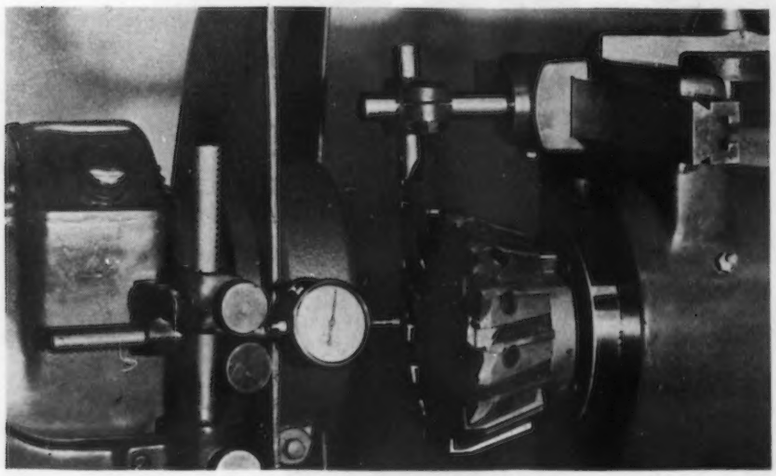
CINCINNATI, OHIO

bort (diamond) wheel, usually having a Bakelite bond, is often used. It is applied in the same way as a regular abrasive wheel, although the depth of cut is held to a minimum. Before using the diamond wheel the steel shank should be ground to size. Standard grinding tool speeds are used. The entire matter of the finish on the cutter blade is determined by the character of work expected of the cutter.

If a dry cutter grinder is used, an oil-soaked felt pad should be applied to the face of the wheel. It will also be better to confine lapping to carbide surfaces only, because the steel portion of the blade may cause the face of the wheel to load or become glazed.



AN indicator securely attached to the grinder and adjustable in two planes materially aids accurate workmanship.

Make Trial Set-Up Before Grinding

Before starting to grind, the operator should familiarize himself with the handling of the machine by going through the following trial set-up without the wheel contacting the cutters.

1.—Make sure that the abrasive wheel is fastened tightly on the spindle.

2.—Mount the cutter in the usual manner.

3.—Check the cutter face runout with an indicator. If the runout is excessive it is likely that there is dirt on the locating faces. Many mills, 6 in. or larger in diameter, have a finish-ground ring on the front face of the body for indicating purposes; with the locating faces clean, this ring will indicate dead true.

4.—If the grinder is equipped with a blower, start it, and then true the wheel face with a diamond.

5.—Set the index finger so that it always contacts the blade being ground. Be sure the finger does not contact the wedge or any part of the cutter other than the blade. The face of the blade is offset and not in the centerline of the cutter. The blade being ground should be set with its face exactly horizontal, regardless of centerline. This may be set with a scale across the face of the blade being ground, or preferably with a pocket spirit level.

6.—Set the ratchet stops on the wheel-spindle slide so that the wheel will pass the blade being ground and permit ample clearance for indexing.

Grinding Clearance on Face

7.—First, rough grind the secondary clearance on the faces. Tilt the wheel spindle to an angle of 5 deg. and have the cutter spindle set to zero. Remove 0.0005 to 0.001 in. per blade during the first revolution of cutter. Pass the wheel back and forth across the blade with a steady motion. After the first time around the cutter, index the cutter one-half turn before starting second time around; one-quarter turn for third round; one-half turn for fourth; one-quarter turn for fifth etc., to balance the cut. This is good practice when grinding the face of the cutter, regardless of the material.

8.—Next, grind the wheel clearance on the face. Tilt the wheel spindle to an angle of 5 deg. and have the cutter spindle set at 5 deg. Grind until the clearance angle overlaps into the tip for approximately 1/32 in. This overlap permits grinding the primary clearance without the wheel leaving the material.

9.—Retouch the secondary clearance with the wheel spindle tilted 5 deg. and the cutter spindle set at zero.

10.—Dress the wheel to remove any steel from body of blade that might be embedded in the grinding faces.

Grinding Primary Angle of Face

11.—Grind the primary angle of the face with the wheel spindle tilted 3 deg. and the cutter spindle set at zero. This is the important face and requires extreme accuracy. Remove 0.0002 to 0.0003 in. per blade during the first revolution of the cutter until the primary face is 1/32 in. wide. At the end of each revolution, turn the cutter halfway around, etc., as in grinding the secondary clearance. On completion of this operation check all blades with the indicator, as all primary faces should be uniform within 0.0002 in.

12.—To grind the outside diameter, swivel the cutter head 90 deg. Set the index finger so that the outside diameter of cutting edge is horizontal with center of cutter. Get the clearance angle by tilting the wheel 5 to 7 deg., depending upon the diameter of the cutter being sharpened. It is not always necessary to grind the outside diameter with each sharpening, as most cutter wear takes place on the face and corners.

13.—Breaking of the corners of the blades is accomplished by grinding three distinct angles. This operation should be performed with caution because it is very easy to grind off too much, with the result that the angle will be excessive. Swivel the cutter head 45 deg. with the wheel spindle tilted 5 deg. for the first angle, then 22½ deg. right and 22½ deg. left for the second and third angles.

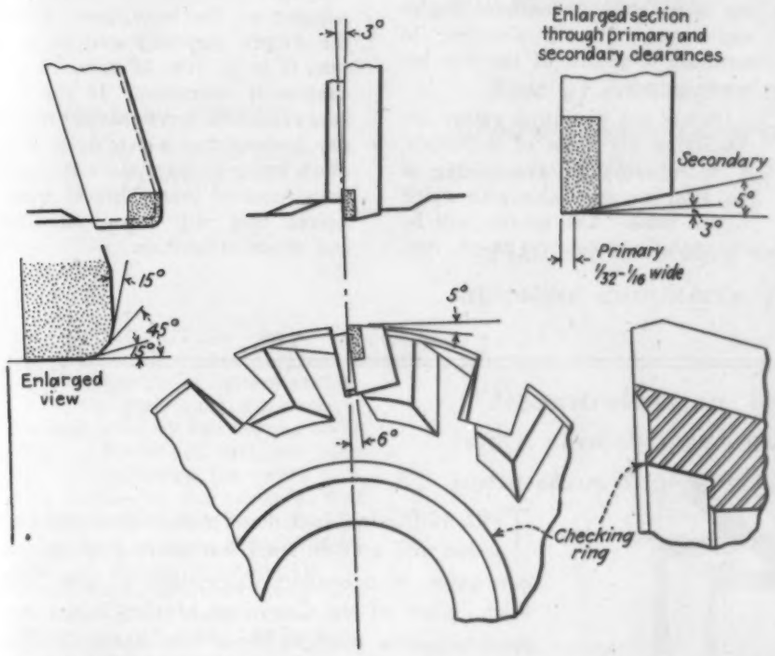
The limits of accuracy for sharpening cutters depend on the

nature of the finish required, but for general-purpose work where a good finish is wanted, keep the faces of the blades within 0.0005 in. This is not as difficult as it may appear at first, providing the wheel-spindle bearings are properly adjusted. Keep the outside diameter uniform within 0.0015.

Whenever possible, sharpen full-back cutters of 3 to 7-in. diameters on the arbors used with them. There is chance of misalinement when changing from one arbor to another and the care of sharpening may be in vain because excessive run-out may develop when the cutter is mounted in the machine.

edges start to round it is time for regrinding. A dull cutter should not require the removal of more than 0.002 to 0.004 in. of material. If more is required, the cutter has run too long and the edges have become too dull. This point should be watched carefully because there is danger of injuring the cutter when operated dull.

It is quite necessary to grind with care. The depth being removed should never be more than 0.002 in., and half or less of this amount is to be preferred. Regrinding of a cutter can be completed in a relatively short time if care is taken not to attempt the



ANGLES recommended for sharpening of tungsten-carbide milling cutters to be used for cast iron. The face of the blade should be ground concentric, and the face sharpened with a secondary and primary land as shown.

Cutters 8 in. and larger are usually alined from the spindle face and by a centering plug on the spindle nose.

Keep Watch of Cutting Edges

The question frequently is raised: "How often should a tungsten carbide cutter be ground?" This cannot be answered definitely because grinding is dependent entirely upon the nature of the cut. It will pay to observe the cutting edges at regular intervals. If the edges are worn away slightly the blades need honing. It is often possible to hone the blades several times between grinds. When the

removal of too much metal at one time and, of course, if the cutter has not been permitted to run until it is excessively dull. If an attempt is made to grind too rapidly, the surfaces of the inserts are likely to check or crack. While this might not be detrimental, it certainly is not of any benefit. Play safe, grind often, and with care. An 8-in. cutter can be ground in approximately 40 min; a 5-in. cutter in 25 min., or less.

Use of a centering plug with large cutters in addition to the fit in the counterbore means that two locating points are used instead of one—double insurance against misalinement. Suppose the spindle nose were worn a thousandth of an inch, or so, or that the counterbore in the cutter was a trifle oversize. The cutter would have freedom which might cause vibration when the cutter is in use.

Avoid Excessive Overhang in Resetting

When blades require resetting, after a number of sharpenings, the heel edge should not extend beyond the cutter body more than about 1/16 in. Excessive overhang results in excessive deflection. Since carbides are extremely hard, they are apt to yield under repeated deflection, resulting, quite naturally, in breakage. It is well to remember that under a given load the amount of deflection increases by the cube of the overhang. A blade having ⅛ in. overhang will deflect eight times more than a blade with only 1/16 in. overhang. For better results keep the overhang to a minimum.

Precautions in Applying Carbide Cutters

Maintenance of these cutters extends also to their use in the shop. Carefully analyze every milling operation before applying the cutters. Do not try to mill all the difficult jobs at first. Begin by milling flat-face surfaces where a uniform amount of material is to be removed. With experience the field of application can be broadened.

See that the machine to be used is in good condition. Old machines do not offer successful applications. If a used machine is to be considered, tighten up all bearings, and see that there is no end-play or backlash in the spindle.

Give the operator full instructions before allowing him to start. He should be familiar with the characteristics of this metal; if he is not, take plenty of time to explain what it is, how it works, its advantages, and other information that is necessary for the assurance of success. A few minutes spent in this way will assure you of his confidence and his cooperation.

Start New Set-Ups Slowly

If the operation is a new set-up, start slowly and carefully. Do not try to obtain maximum results on the first cut. Run the cutter somewhat slower, and use less feed than you would ordinarily desire

bort (diamond) wheel, usually having a Bakelite bond, is often used. It is applied in the same way as a regular abrasive wheel, although the depth of cut is held to a minimum. Before using the diamond wheel the steel shank should be ground to size. Standard grinding tool speeds are used. The entire matter of the finish on the cutter blade is determined by the character of work expected of the cutter.

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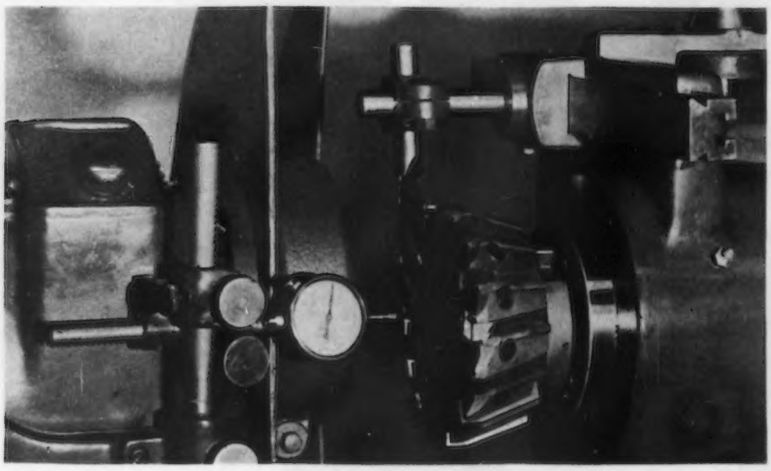

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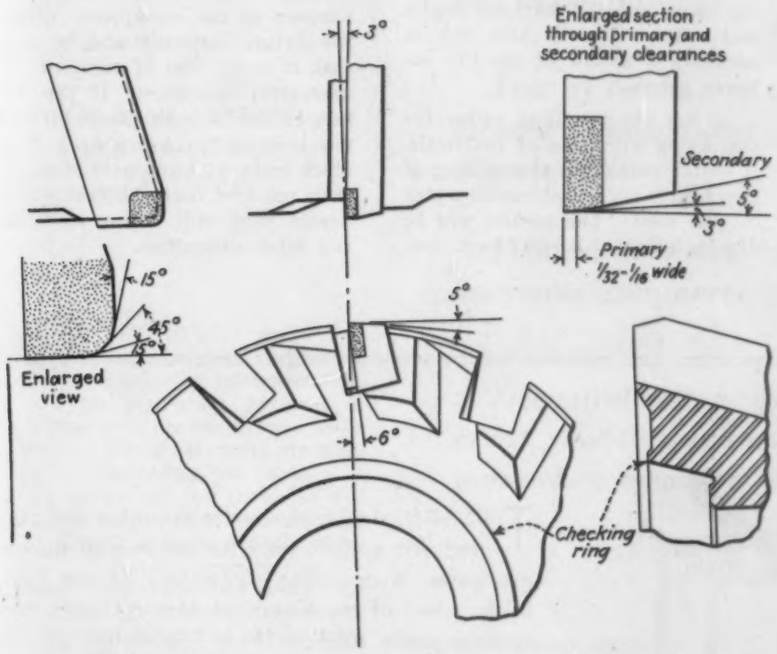
nature of the finish required, but for general-purpose work where a good finish is wanted, keep the faces of the blades within 0.0005 in. This is not as difficult as it may appear at first, providing the wheel-spindle bearings are properly adjusted. Keep the outside diameter uniform within 0.0015.

Whenever possible, sharpen full-back cutters of 3 to 7-in. diameters on the arbors used with them. There is chance of misalinement when changing from one arbor to another and the care of sharpening may be in vain because excessive run-out may develop when the cutter is mounted in the machine.

edges start to round it is time for regrinding. A dull cutter should not require the removal of more than 0.002 to 0.004 in. of material. If more is required, the cutter has run too long and the edges have become too dull. This point should be watched carefully because there is danger of injuring the cutter when operated dull.

It is quite necessary to grind with care. The depth being removed should never be more than 0.002 in., and half or less of this amount is to be preferred. Regrinding of a cutter can be completed in a relatively short time if care is taken not to attempt the



ANGLES recommended for sharpening of tungsten-carbide milling cutters to be used for cast iron. The face of the blade should be ground concentric, and the face sharpened with a secondary and primary land as shown.

Cutters 8 in. and larger are usually alined from the spindle face and by a centering plug on the spindle nose.

Keep Watch of Cutting Edges

The question frequently is raised: "How often should a tungsten carbide cutter be ground?" This cannot be answered definitely because grinding is dependent entirely upon the nature of the cut. It will pay to observe the cutting edges at regular intervals. If the edges are worn away slightly the blades need honing. It is often possible to hone the blades several times between grinds. When the

removal of too much metal at one time and, of course, if the cutter has not been permitted to run until it is excessively dull. If an attempt is made to grind too rapidly, the surfaces of the inserts are likely to check or crack. While this might not be detrimental, it certainly is not of any benefit. Play safe, grind often, and with care. An 8-in. cutter can be ground in approximately 40 min; a 5-in. cutter in 25 min., or less.

Use of a centering plug with large cutters in addition to the fit in the counterbore means that two locating points are used instead of one—double insurance against misalinement. Suppose the spindle nose were worn a thousandth of an inch, or so, or that the counterbore in the cutter was a trifle oversize. The cutter would have freedom which might cause vibration when the cutter is in use.

Avoid Excessive Overhang in Resetting

When blades require resetting, after a number of sharpenings, the heel edge should not extend beyond the cutter body more than about 1/16 in. Excessive overhang results in excessive deflection. Since carbides are extremely hard, they are apt to yield under repeated deflection, resulting, quite naturally, in breakage. It is well to remember that under a given load the amount of deflection increases by the cube of the overhang. A blade having ⅛ in. overhang will deflect eight times more than a blade with only 1/16 in. overhang. For better results keep the overhang to a minimum.

Precautions in Applying Carbide Cutters

Maintenance of these cutters extends also to their use in the shop. Carefully analyze every milling operation before applying the cutters. Do not try to mill all the difficult jobs at first. Begin by milling flat-face surfaces where a uniform amount of material is to be removed. With experience the field of application can be broadened.

See that the machine to be used is in good condition. Old machines do not offer successful applications. If a used machine is to be considered, tighten up all bearings, and see that there is no end-play or backlash in the spindle.

Give the operator full instructions before allowing him to start. He should be familiar with the characteristics of this metal; if he is not, take plenty of time to explain what it is, how it works, its advantages, and other information that is necessary for the assurance of success. A few minutes spent in this way will assure you of his confidence and his cooperation.

Start New Set-Ups Slowly

If the operation is a new set-up, start slowly and carefully. Do not try to obtain maximum results on the first cut. Run the cutter somewhat slower, and use less feed than you would ordinarily desire

and expect. If all goes well, increase the speed of the cutter slightly, then increase the feed gradually.

If vibration is developed, try to determine its cause and then evolve a remedy. If you find it impossible to overcome vibration, abandon further attempts until the fault is located and corrected. When removing metal at higher rates of speed, it is essential that all conditions be perfect. Vibration causes excessive wear, and very often will cause the inserts to crack or break.

Do not disengage the spindle while the feed is engaged. If the machine must be stopped throw out the feed and let the cutter run for a few moments, then disengage the spindle clutch. If the cutter is stopped while it is engaged in the cut, the sudden shock is likely to set up excessive strains, sometimes resulting in breakage of the inserts.

Do not try to set up an endurance record with carbide cutters. They should give longer life, but there is a limit.

Inspect Reground Cutters

After a cutter has been reground, be sure to inspect it before placing it in service. If a suitable gage or fixture for this purpose is not at hand, it will pay to construct one. Use an amplifying type indicator so that a careful inspection can be made. The faces of the blades should be square within 0.0005 in., and the diameter should run within 0.002 in.

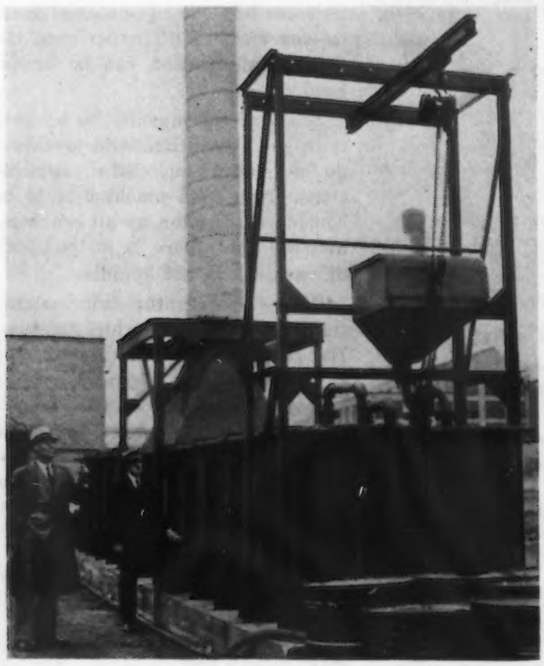
When a milling cut has been successfully performed be sure to record all operating data, including feeds, speeds, clearance angles and rakes. It will also pay to maintain a record of the life between grinds.

Do not use a milling cutter for machining all kinds of materials. A cutter suited for the milling of cast iron is not suitable with which to mill steel. The results will be disappointing. A cutter constructed for milling cast iron will not work satisfactorily on copper. Obtain the right cutter always.

When increasing the speed and feed of a machine there is a likelihood of overloading the motor. To be on the safe side, check the power input with a voltmeter or proper recording instrument. A motor may be overloaded for a short time without harmful effects; but, if the overloading is constant there is danger of running into difficulties.

Fixtures Should Be Checked

Sometimes milling fixtures can be used without any changes, although in other cases it will be necessary to provide additional support to the workpiece. Check the fixture carefully and be sure that it is all that is required for successful operation. If the fixture cannot be reconditioned it will pay to construct a new one. It is much better to have more strength than required than inherent weaknesses that will cause vibration and other difficulties.



THIS 40-ft. steel tank, lined with rubber and provided with a 60-ft. stack for carrying off poisonous gases, is operating successfully at the Flint, Mich., plant of the Chevrolet Motor Co. to turn cyanide waste solutions from the metal cleaning and polishing departments into a non-toxic liquid, harmless to fish, before being discharged into the river. Recently 4500 gal. were treated at once by addition of more than two tons of sulphuric acid, followed by aeration for 16 hr. Before being treated, each gallon of waste solution contained 2.8 oz. of copper cyanide and 1.1 oz. of free cyanide. After treatment, the analysis showed less than one part per million of free cyanide, with quantities of copper sulphate and sulphuric acid so small as to be harmless when gradually discharged into the stream over a period of two days. Inspecting the apparatus are William Notman (left), Chevrolet plant manager, and A. G. Spencer, metallurgist.

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THIS WEEK IN WASHINGTON

Congress returns to "horse and buggy" principles; outmoded law of gravity may now come back into its own.

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Processing suits threaten AAA and flow of pap to the farmer.

o o o

Test of commerce clause of Constitution indicated by enactment of Wagner-Connery labor disputes bill.

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Federal licensing of companies engaging in interstate commerce proposed by A. F. of L.

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Decentralization of huge Federal bureaucracy, shot through with nepotism, more to the point than decentralizing of industry.

o o o

BY L. W. MOFFETT
Resident Washington Editor, The Iron Age

o o o

WASHINGTON, July 9.—The New Deal begins to resemble a tatterdemalion. . . . Its glamorous garment of planned economy has become badly torn. . . . Worse yet, parts are missing . . . including the pants. . . . This section of the ensemble was most highly prized economically . . . as well as being socially desirable. . . . But an inconsiderate Supreme Court snatched away this essential of raiment, known as NRA, now faded and hardly more than a fitful memory.

Even the worm will turn . . . and the House of Representatives, recovering some of its dignity and self-respect, revolts and, in the face of the club of Administration lobbyists, deals a smashing blow against the "death" sentence clause in the holding company bill. . . . A mighty sock it was. . . . The smoke screen for an investigation of public utility lobbyists was countered with an investigation also of Administration lobbyists . . . and like most investigations will gain the front page for awhile and then go into the limbo with other forgotten things.

Who is a lobbyist? . . . the other fellow? . . . And has business no right to defend itself against confiscatory legislation? . . . Business and its stockholders, the latter made made up of many in the family of John Q. Public, in turn make up constituencies of the revolting house members . . . and some of latter frankly said it was because of the demand from these voters that they voted against the death sentence. . . . When these voters speak one way and the White House the other way, the voice of the latter is weak indeed. . . . The significance of the blow was emphasized by the fact that the House previously had truckled to every piece of legislation sent to Congress by the White House. . . .

Headed for further ripping through court tests are AAA, with processing suits piling up to dizzy heights, but more important, shutting off the flow through the pap luring the Administration-inspired lobbying farmer, who sooner or later will find he will pay for the "gift" through additional taxation, etc.

White House sponsored TVA legislation may take a lacing in the House. . . . The banking bill is greatly modified so that it is considerably different from the ready-made Federal-credit control measure offered by the Treasury Department. . . . The trial balloon to see if the soak-the-rich tax program could be jammed through Congress over the week-end was punctured, just as were trial balloons to see how the country felt with respect to constitutional amendments to give fancy trimmings to the New Deal "planned economy" suit.

The Wagner-Connery labor disputes act and the Guffey nationalization coal bill are headed for ripping in the courts . . . as would be the ridiculous NRA licensing bill over which President Green of the American Federation of Labor held a powwow at the White House last Wednesday, well knowing he would get nowhere. . . . But it is necessary to keep the flow of demands moving. . . . They have achieved un-

precedented fruits the past two years . . . much of which likely will turn sour. . . .

Remarkable discovery, this thing that there is more than one branch of the Government . . . Congress evidently is starting to assert itself, perhaps because it is no longer at all certain that hanging on to the New Deal's coat tail is a good political stunt. . . . On the contrary, it is dangerous when the home folks make a kick against the performance. . . . It's an old American custom to rebel against dictatorship, readily accepted temporarily though it is all too often.

One of the feigned reasons for maintaining the AAA program, so far as the Supreme Court will permit, is to develop a parity between agricultural and manufactured product prices, a parity that has been reached . . . but promises soon to see the agricultural line pass beyond the industrial line . . . which recalls that the one-time fetish for the 1926 level of prices seems to have become only a dream.

It is still a cult, however, to keep kiting agricultural prices, if possible, through AAA, crop reduction and other synthetic means . . . but there is distinctly less interest in seeing industrial prices go up further. . . . Indeed it is clear some New Dealers are convinced industrial prices might well be brought down. . . . Moreover, the view is not confined to this group. . . . It was the thought that codeless industry would see this development and fanatical NRA adherents are both surprised and secretly aggrieved that its passing produced not more than a ripple on the economic escutcheon. . . . But if AAA should pass out by court edict or otherwise, the political thunder would make the two-hour dissertation on the Supreme Court's "horse and buggy" NRA decision sound like a freshman's halting thesis.

And in view of what remains of NRA, there is the distinct impression that the steel industry is not going in for a voluntary agreement under the more or less tender aegis of the Federal Trade Commission. . . . At the outset is the well known dislike of the industry for the commission and of the commission for the industry. . . . There would be a doubtful cooperation, despite the assertion that the commission is anxious to cooperate with industry. . . . Also, it is questionable as to what the commission can possibly do for industry other than it did under the old trade practice conferences . . . some of which clearly were helpful in establishing fair trade practices, due principally, however, to the industries themselves, operating through their trade associations. . . . And these practices can be maintained without the commission's aid . . . or other Governmental intrusion.

Inquiries addressed to the FTC as to what can be done under voluntary agreements indicate one principal motive of inquiring industries is that perhaps with an FTC connection there is afforded Governmental sanction that otherwise would not prevail. . . . Actually now that the President has returned its trade practice baby back to the FTC, to the latter's great joy, it is not yet known what can be done with it. . . . The NRA was so completely wrecked by the Schechter decision that FTC has to watch its step to bar "monopolistic" practices and otherwise see that the anti-trust laws are kept in full force. . . . The White House conference at which NRA was liquidated and FTC authorized to proceed with voluntary agreements is said to have gone rather fully into the anti-trust phase of the question. . . . The presence of Attorney General Cummings is taken to indicate as much, and he is understood to have made it clear that the Government would have to proceed carefully in entering into voluntary agreements with industry. . . . It was pointed out, however, that the FTC and Department of Justice will work together to avoid conflict in policies under voluntary agreements.

Apparently the only legal force the voluntary agreements will have will be based on FTC cease and desist orders for violation of practices clearly illegal. . . . And, at that, these orders can apply only to practices involving interstate commerce. . . . Wage and hour standards can be included in the agreements, or they can be omitted. . . . NRA will have nothing to do with them, as was originally proposed . . . FTC never included labor provisions in its agreements.

The only thing really left of NRA is its Review Division to be engaged in "fact-finding" work, investigations as to breakdowns of old code hours, wages, etc., though it can do nothing about such breakdowns where they are discovered. . . . It is unfortunate that NRA has come to this low estate when it has at its head the able James L. O'Neill. . . . Many think that the NRA would never have dropped into the fatal pitfall into which it headed had Mr. O'Neill been its administrator from the outset.

With the passing of NRA it is evident that the Administration has given up previous plans to institute further NRA legislation at this session, at least. . . . President William Green of the American Federation of Labor, perhaps perfunctorily, and through the force of habit of always "demanding" something, asked the President to urge passage of the Federation's licensing bill . . . another unconstitutional measure. . . . But it certainly will get nowhere at the present session . . . nor is it likely to get anywhere at any future session . . . Mr. Green himself had expected as much.

The bet now is that further NRA legislation of any kind is extremely doubtful . . . that if business and industry will go out on their own initiative and draw permanently away from Washington and Governmental regimentation, put and keep their own house in order, it will be extremely wholesome in the direction of real recovery . . . and less expensive to business and industry and the taxpayers generally, called upon under the "planned economy" scheme to support an enormous bureaucracy with an enormous payroll, which in May reached the dizzy height of some 102,000 civilian employees in Washington alone. . . . The entire Federal payroll for May was $108,226,536, at the rate of $1,298,718,444 per year! . . . Which makes talk of decentralizing industry sound almost funny. . . . Industry might well urge decentralizing of the Federal Government . . . and with it decentralizing of nepotism, which has reached an unprecedented scale . . . practised by both parties . . . including demagogues who rant against business and cry for distribution of wealth, and aid to the unemployed, which they carefully avoid giving in the way of either jobs or money. . . . Both are saved for their own families or relatives . . . many of whom do not do a dime's worth of work.

The feeling against the New Deal among Democratic members of Congress is, of course, obviously growing stronger . . . but the White House lash still is probably potent enough to prevent open rebellion . . . but the outbreaks, such as against the death sentence and in prospect on other legislation, mean the New Deal will have to do considerable patching of its suit of "dictated economics." . . . And the walkout of business men from the New Deal is splotching and tearing the garment quite noticeably.

General Wood, of Sears, Roebuck & Co., apparently could no longer stand being a mere figurehead in the Works Relief "program," with its chaotic, muddled moves, and conflict among Government officials. . . . So the General found relief by walking out on his job as a member of the allotment board. . . . Explaining his leaving, it was said

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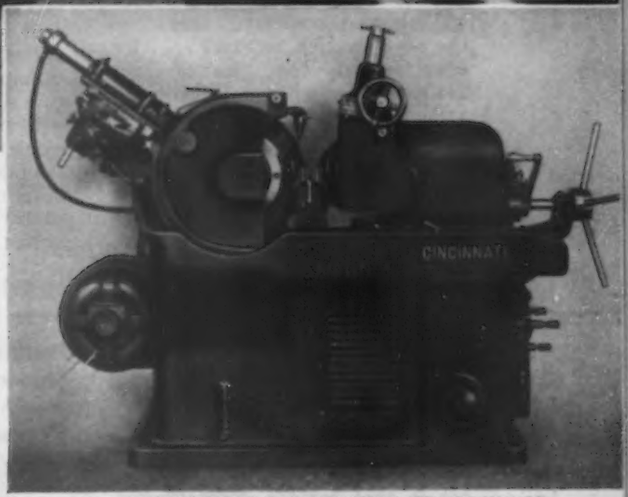

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that he had promised to serve only Until July 1. . . . Other members of the board are said to be anxious to get out. . . . Meanwhile the number of departing business men on the Roper Business Advisory Council is increasing. . . . General Wood remains as a member of the council, but here is a list of former associates who have left it: Edward L. Ryerson, Jr., Chicago, president, Joseph T. Ryerson & Son, Inc.; Harold C. Smith, Chicago, president, Illinois Tool Works; Robert L. Lund, board chairman, National Association of Manufacturers; Howard Heinz, Pittsburgh, president, H. J. Heinz Co., and James F. Bell, Minneapolis miller. . . . The public has been told quite seriously, however, that there was and is no dissension within the council. . . . On the other hand there is a widespread belief that the Administration does not want advice . . . rather that it wants approbation . . . but which, seeing the knocks it has received at the hands of the courts and at the hands of a Congress that has developed some real spunk, it is not always getting.

What an old-fashioned "horse and buggy" member of Congress is Chairman Doughton of the Ways and Means Committee! . . . who would perhaps deny it but seems to find the Congressional revolt spirit to be infectious. . . . He says Congress has no right to levy taxes for any other purpose than "to raise revenue." . . . How materialistic, too, and how grossly indifferent to the much heralded social reform on which the tax program was supposed to be based with revenue a mere incident. . . . How sweetly innocent to think of the out-moded constitution . . . or is it another rip in the soiled garment of "planned economy," this time the soak-the-rich section? . . . He even protests that "we can get more revenue without injustice to any individual." . . . Refreshing nevertheless . . . refreshing too that the White House, seeing the futility of its original soak-the-rich program, proposes broadening of the income tax groups, long seen as inevitable, with more to come. . . . And hearings now are under way before the Ways and Means Committee, with at least some political baiting thrown into the discard, and a more sensible plan has been sincerely undertaken, it is hoped, to raise taxes, bound to go into the pockets of the little as well as the big fellow. . . . And the best bet is that instead of costing it will make votes for the Administration . . . even if it takes up practical economics and becomes as old-fashioned as are others, including Chairman Doughton . . . and Finland, the latter so ancient as to believe in the payments of its debts.

If this thing keeps on, the outmoded law of gravity will come back into its own, along with love of mother . . . and the destruction of crackpot isms.

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Free Zone Rules Issued

Rules and regulations governing foreign trade zones have been promulgated by the Foreign Trade Zones Board, composed of Secretary of Commerce Roper, chairman; Secretary of the Treasury Morgenthau and Secretary of War Dern. The zones are authorized under an act of the seventy-third Congress. Within the zones, commodities are free from usual customs regulations.

The aim of the plan is to foster the dealing in foreign goods that are received, not for domestic consumption, but for reshipment to foreign markets and for manipulation, including combining with domestic merchandise previous to exportation.

The board has designated Thomas E. Lyons, acting chief, Transportation Division, Bureau of Foreign and Domestic Commerce, as executive secretary, and Dr. L. P. Nickell of the same division as his assistant. Their offices are in room 6829 of the Department of Commerce Building, where applications from interested port cities will be received and studied.

The board announced that it prefers that applicants defer until after the printed regulations are available. Secretary Roper said he deems it advisable for the designation of the free trade zones to proceed slowly and consistently with sound economics. There is no provision in the act for the expenditure of Federal funds in connection with the construction and equipment of a foreign trade zone. On the other hand, applicants must be prepared to carry out the projects on their own initiative and are required to submit to the board methods proposed to finance the undertaking.

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Pittsburgh Firms Aid Store Front Modernization Campaign

SPECIAL interest in modernization is being stimulated by the Federal Housing Administration "Modernize Main Street" campaign. The borrowing limits have just recently been raised from $2,000 to $50,000 in order that the owners of larger buildings might make use of the services of the F.H.A. Booklets pertaining to this campaign will be distributed to 3,500,000 property owners.

The Pittsburgh Plate Glass Co. and the Westinghouse Electric & Mfg. Co. have made available four slide sound films treating store fronts and lighting in an interesting and helpful manner. They deal with the theory and practice of proper store fronts and illumination, showing many excellent examples which should be invaluable to progressive merchants and property owners.

Each film is a complete story in itself and lasts ten minutes. "The Eyes Have It," graphically portrays striking examples of the best type front for various businesses and the importance of individualized exteriors. "Here's How," the second film, presents actual case histories of dingy stores amazingly transformed into business-getting establishments. Statements of owners showing actual sale and profit increases amply prove the value of such modernization. Next comes "Dollars on Parade," which deals with the important but frequently neglected subject of proper show window illumination. Information compiled by lighting experts is dramatically presented and specific lighting recommendations are made for various types of display windows. To complete this interesting story on the value of modernization, the final film "Selling With Light" shows examples of dreary interiors and inefficient show cases. Their increased power of attraction, after the suggestions of illuminating engineers have been followed, is fully shown and the reasons for this great improvement are interestingly demonstrated.

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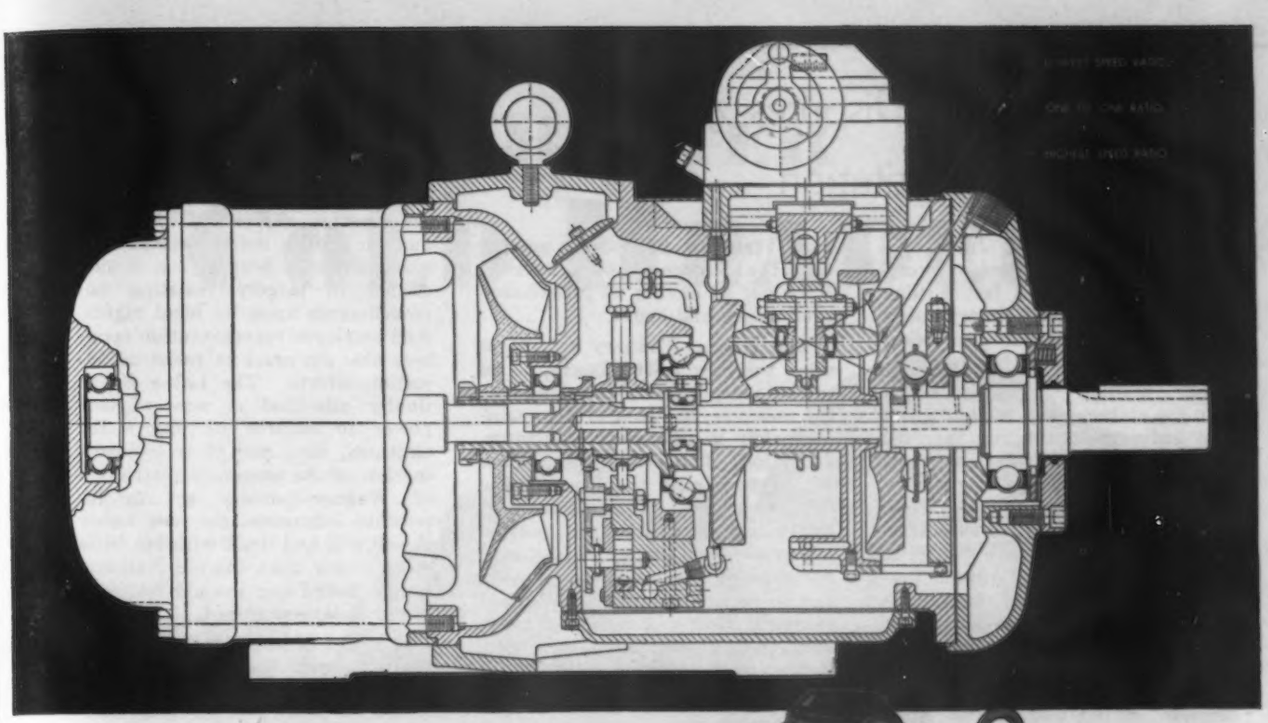
Works Relief Allotments for 40 Non-Federal Projects

The President has approved 40 local non-Federal projects involving $5,110,689. Of the total, $2,576,225 represented grants for projects in New York, of which the largest sum was $993,681 made to Kings County Hospital for the construction and equipping of a steel frame fireproof nurses' home. A grant of $495,000 was made to New York City for additions and improvements to the mechanical plants of Gouverneur, Sea View, Coney Island, Metropolitan, Lincoln, City Home, Kensington Avenue, Greenpoint and Fordham hospitals.

Reed-Prentice Corpn., Worcester, Mass., has appointed as exclusive agents in Pittsburgh territory J. S. Miller Machinery Co., which will cover sale of line of machine tools including engine, toolroom and production lathes, vertical milling and die sinking machines.



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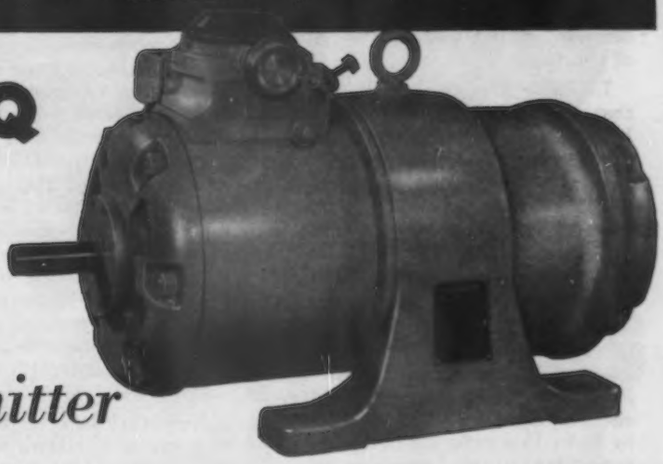

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Speed ratio 6 to 1. ▲ Positive drive under all conditions, including shock load, rapid reversing or extreme overload.

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Automatically shifts to low-speed, high-torque position whenever stopped. Prevents overloading of motor when starting.

Speed control easily arranged to take care of machines requiring non-uniform or irregularly timed speed changes. ▲ Direct or remote fingertip control of speed for any kind of installation.

Adaptable to any mounting position, vertical or horizontal, sidewall, ceiling or floor. ▲ Completely New Departure Ball Bearing-equipped. Rolling parts inherently in balance, assuring long life, quiet operation and freedom from vibration at all speeds.

Built with any make of motor to suit individual requirements. Catalog PI upon request. The New Departure Mfg. Co., Bristol, Conn.

NEW DEPARTURE *Variable Speed* POWER UNIT

Scope of Labor Disputes Act Limited by Constitution

WASHINGTON, July 9.—Without ceremony, President Roosevelt last Friday signed the Wagner-Connery labor disputes bill and in doing so issued a statement to which has been attached considerable importance.

In the statement he made it clear that enforcement of the act will be limited strictly to interstate commerce. Necessarily legislation passed by Congress is so restricted. But for the President to specifically point out the fact gave weight to the impression that the Administration is giving greater recognition to constitutional limitations than would be indicated by its insistence upon passage of this and other doubtful legislation and to adverse decisions it has met at the hands of courts.

Likewise it is the growing view that the American Federation of Labor, sponsor of the Wagner-Connery bill, realizes that the measure gives it no such power as it affected to believe it would. In any case, it is quite conceivable that the President's statement altered that view, if it actually existed in the minds of its officials.

Again, while it is realized that the act will create trouble between labor and industry, though the President puts an entirely different construction on it, it is thought by many that industry in its strong opposition to the measure overemphasized its force toward unionization of workers. Not that intense effort in that direction will not be made, but rather that, by reason of judicial precedent, based on the commerce clause of the Constitution, labor will find that the President truly said the act does not cover all industry but affects interstate commerce only.

"It may eventually eliminate one major cause of labor disputes," the Presidential statement said, "but it will not stop all labor disputes. It does not cover all industry and labor, but is applicable only when violation of the legal right of independent self-organization would burden or obstruct interstate commerce."

The question arises as to what is interstate commerce, a century-old question. Court after court has held manufacturing is not interstate commerce. In the Weirton Steel Co. case, Judge Nields at Wilmington, Del., held Section 7-a to be unconstitutional. In the more famous Schechter poultry case the Supreme Court knocked NRA out as having no jurisdiction over wages and hours.

The Wagner-Connery act places upon the new Labor Board, to be set up independently to administer the measure, the task of determining what is interstate commerce, a big job. It also will be charged with determining the scope of the act otherwise. Even though it might lean well toward organized labor, and even though the act says decisions of the board are not subject to review, except as to factual evidence, this will not stop court tests, which are, of course, inevitable.

Immediately the chief advantage organized labor is expected to derive from the new act is to make a fast and more intensified drive for unionization of labor in the hope that it can accomplish much, pending court suits. On the part of industry one of the chief difficulties is the manner of bringing cases into court. Prominent legal authorities for some time have been studying this angle of the situation. Judging by past experiences under the New Deal, the Government will be loath to institute proceedings, as industrialists are hoping it will.

Nevertheless, even in the absence of a test of the law, there is doubt that organized labor will meet with so great a success in further unionization of workers as has been predicted for it by opponents of the measure, to say nothing of its proponents. This opinion is based on experience under Section 7-a, written into the National Industrial Recovery Act. It is recalled that organized labor estimated it would increase its membership 25,000,000. It is doubtful if it made a gain of 1,000,000. And there is a question as to whether A. F. of L. membership today is as large as it was when the recovery act went into effect.

The recovery act went into effect when the depression was at almost its worst. Labor unrest was widespread. The psychology for unionization was at its height. And strong appeal was made by the misrepresentation of organized labor that Section 7-a compelled unionization.

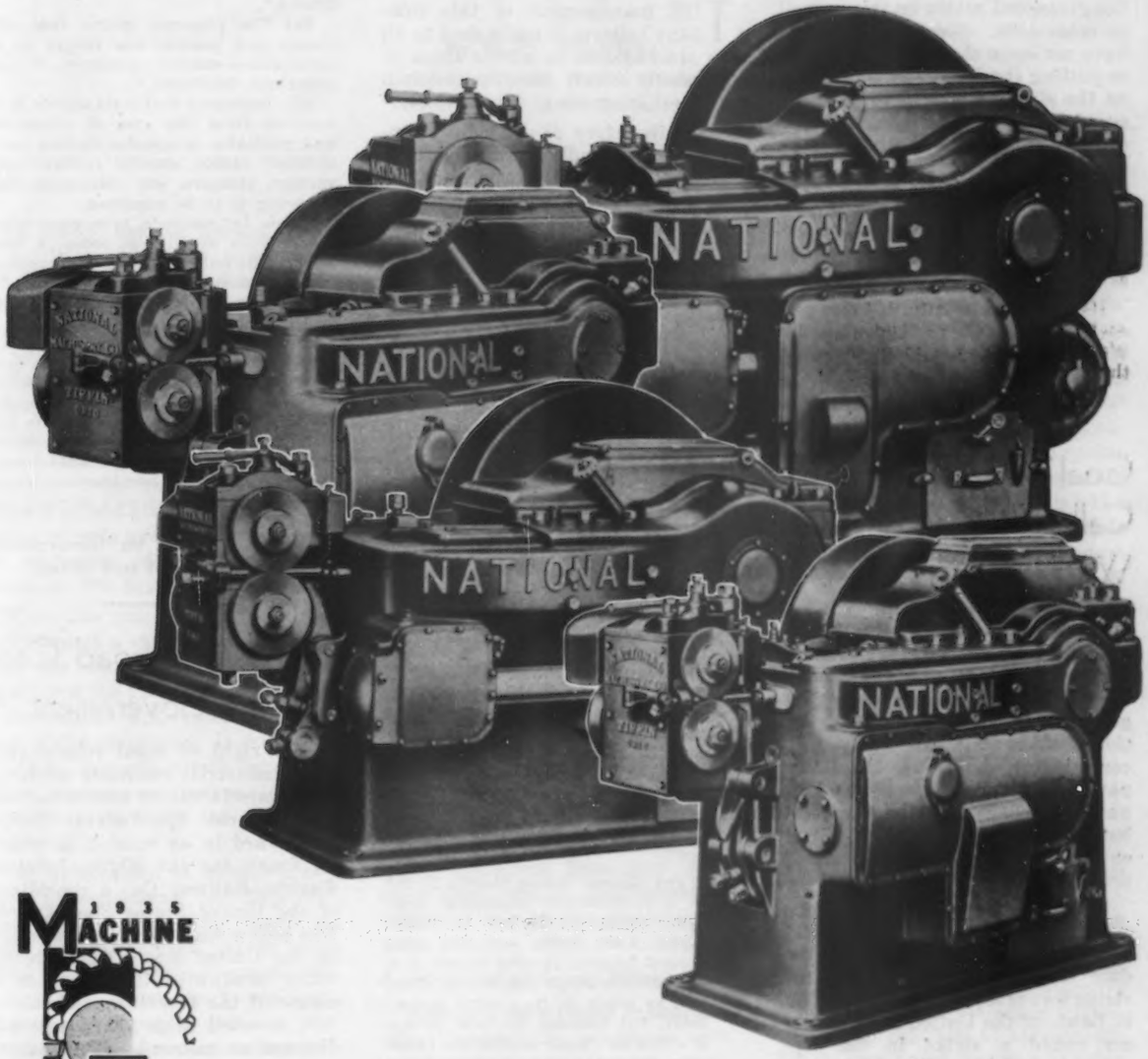
Today the drama is missing. Realities are more existent. Workers well know they are not compelled to join a union. It was not necessary to say so but as much has been said by Senator Wagner, original author of the Wagner-Connery act. Industry also knows better than previously how to meet unionization efforts and, though it had to suffer many strikes, and violence under Section 7-a, it succeeded in largely resisting encroachments upon its legal rights. And employee representation members also did much to resist unionization efforts. The Labor Board finally admitted it was without power to enforce its orders for elections, etc., and it is believed, in view of the necessary restriction of Wagner-Connery act to interstate commerce, the new Labor Board will find itself with but little more power than the old National Labor Board and the old National Labor Relations Board.

It is not to be doubted, however, that the new board will seek to exert its full power and the fear is that, if pro-organized labor dominated, it will go beyond that point. This is taken to mean labor disputes may be expected to be widespread and that industry will have to reopen the trail to Washington and appear before the board, as it did in the former heckling days of the labor boards, unless it declines to do so and invites court tests at the hands of the Government.

The President recently reestablished the National Labor Relations Board, following its temporary abolition on the strength of the Schechter decision. It was appointed to function till July 1 and later extended to Aug. 1, clearly with a view to setting up a board under the Wagner-Connery act. The National Labor Relations Board now has only one member as the result of resignation of two members, Chairman Biddle having resigned formally on the day the President signed the new labor act. The only remaining member is Edwin Smith, former Massachusetts labor commissioner.

The President also has reestablished the old Steel Labor Relations Board and the Textile Labor Board. It is the believed that, while shifted to the Department of Labor to work with its mediation division, these boards may be transferred again to operate under the new Labor Board, acting for labor disputes in the steel and textile industries. Should it be the plan, as such a move would indicate, to set up special boards for major industries, it is assumed of course one would be set up for the automotive industry. By reason of the fact that the new act calls for the majority rule, the old Automobile Labor Board could not be

BETTER
COLD HEADERS



1935 MACHINE TOOL SHOW
CLEVELAND SEPT. 11-21

SEE NATIONAL'S WORKING EXHIBIT IN SPACE 23-A

National Cold Headers do produce more and better work. Even though speeds are higher die life is longer and upkeep is less . . These advantages are due to new, revolutionary and patented features found only in National.

THE NATIONAL MACHINERY COMPANY
TIFFIN, OHIO

recreated under its principle of proportional representation.

Whatever the Wagner-Connery act may or may not accomplish, it is reported in authoritative services that its enactment saved President William Green from being ousted next October as head of the American Federation of Labor. It is well known that a radical element in organized labor had put much pressure on Mr. Green to get Congressional action on this as well as other bills. Some of the others have not come through, but success in putting the Wagner-Connery act on the statutes is held to have assured his reelection, though this is doubted in some of the more radical elements of organized labor. Some industrialists, seeing that enactment of the Wagner-Connery bill probably prevented radical control of the A. F. of L., feel that it at least has some compensations.

Its signing also afforded one pen each to Mr. Green and Senator Wagner. The President donated the pens.

Coal Strike Is Again Called Off By Lewis

WASHINGTON, July 9. — The much touted coal strike is off again — this time until Aug. 1. Meanwhile the United Mine Workers of America, together with a section of coal operators, are holding the strike bludgeon over Congress to enact the Guffey coal nationalization bill. It likely will come before the House the latter part of the present week and be passed, perhaps modified somewhat but not in essential details. It is on the Administration's "must" program.

When the House did not truckle sufficiently to the coercive drive for passage of the bill by June 30, the date to which the first proposed strike was extended, President John L. Lewis of the United Mine Workers called a strike in the Appalachian field. This was last Saturday. It followed the customary breakdown in negotiations the union officials held with operators, who refused the union demand for a 30-hr. week and an average of a 10 per cent increase in pay. The operators proposed continuance of the present agreement until April 1, 1936, calling for a 35-hr. week. The real move back of the negotiations is to enforce passage of the Guffey bill.

The strike call stirred Administration officials to action—an action which the union was afraid would not be taken.

Graduated Corporation Income Tax Condemned as Discriminatory

IN a letter to stockholders dated July 5, E. T. Weir condemned the proposed Federal graduated income tax as discriminatory and unsound. He said:

THE management of this company believes it has a duty to all its stockholders to advise them of proposals which directly threaten the best interests of the company.

We therefore direct your attention to the pending proposal for a graduated Federal corporation income tax, under which companies with large profits would pay at a higher rate than companies with small profits.

This means that the dividends which can be paid you will be reduced if the company is successful.

The proposal is discriminating and unsound for the following reasons:

(1) It confuses the income of the individual and the income of the corporation. Because the corporation has a large income it does not follow that its stockholders have large incomes. Consider these illustrations:

(x) John Jones, with an income of $5,000 a year, invests $1,000 in a large and successful company, whose earnings would be taxed at the highest rate. Henry Robinson, his wealthy neighbor, invests $10,000 in a smaller company which is equally successful, but because of the small size of the company its total profits are so small they will be taxed at the lowest rate. Why should John Jones have his income from his investment taxed proportionately more than Henry Robinson?

(y) George Brown invests $1,000 in a $100,000,000 successful company, whose profits will be highly taxed; John Smith, with the same annual income, invests $1,000 in a $1,000,000 corporation, which earns just as much on its capital investment, but because its total profits are smaller, these profits are taxed less. Here are two men with equal incomes and equal investments, yet the Government proposes to penalize the man who has invested in the large company.

(2) Most of the investors in large companies are persons with relatively small investments.

The value of common stock held by the average investor is $2,700—which means that millions of investors own less than this amount.

Many of the owners of small companies are wealthy individuals who individually own a large part of the companies.

This proposal penalizes the small investors in the large corporation, as compared with both the large and small investors in small concerns.

(3) The proposal penalizes the man who uses good judgment by investing in a small company which later becomes successful and makes large profits.

(4) The proposal means that efficiency and success are things to be penalized — exactly contrary to our American traditions.

(5) Increased living standards have resulted from the rise of successful and profitable companies making automobiles, radios, electric refrigerators, vacuum cleaners, etc. Manufacturing efficiency is to be punished.

Think, for example, how much more automobiles would cost today if they were made only by small companies—yet this proposal is designed to force the breaking up of big companies into small companies.

(6) If investments become less attractive because of penalities on successful investment, then it will be more difficult for industries to get funds with which to operate; this will mean that it will become increasingly difficult to continue operations, and that the volume of employment would be reduced, and recovery further delayed.

Why not insist on Government economy instead of new taxes?

Industrial Railroad Case Lost by Government

THE right of legal relationship of industrial railroads affiliated with manufacturing companies has been upheld by Federal Judge Woodward in an opinion in which he found for the Elgin, Joliet & Eastern Railway Co., a subsidiary of the United States Steel Corpn. The action was filed two years ago by the United States Government, which predicated its action on a clause of the Interstate Commerce Act, inserted some years ago and directed at railroads which owned or controlled coal mines in Pennsylvania whose products were shipped over the owning railway line. The Government sought to enjoin the railroad from carrying in interstate commerce the products of the United States Steel Corpn. or its subsidiaries.

District Judge Woodward held that the railway company acted freely within its own management and operation and without domination or unlawful influence on the part of its owner, the Steel Corpn. It is not now known whether the Government will appeal from this decision.

Employee Cooperation Can Prevent Steel Plant Accidents

By M. H. STEARNS

Safety Director, Buffalo Plant, Republic Steel Corpn.

WHAT can be accomplished in accident prevention through cooperation of employees, supervising forces, and management, has been demonstrated by workers of the Buffalo plant of Republic Steel Corpn., a National Safety Council member.

This plant, employing an average of 1434 workers, operated from May 23, 1934, until Jan. 2, 1935, without a "lost-time" accident. This period of safe operation represents an exposure of 2,179,121 man-hours, or 224 days.

When the many hazards in the operation of a steel plant, together with the man-hour exposure, are considered the record stands out as a remarkable achievement on the part of the employees. It could not be made, nor can credit for it be taken, by any one person. There must be team work and cooperation by all.

The elimination of unsafe practices is considered by Republic Steel Corpn. as a basic factor in such an achievement. It is conceded that every unsafe practice is a potential "lost-time" accident. Therefore, Republic believes in eliminating all unsafe practices before they finally result in injuries to the employees. The company has found it cheaper, both in money and effort, to wipe out unsafe practices as far as it is humanly possible, than to tolerate them.

Departmental Safety Committees

Another matter, which, also, is in some way responsible for the good record, is the make-up of the departmental safety committees. They are composed of all the foremen, who, in turn, hold weekly group safety meetings with their respective men. Out of these meetings many important safety ideas come.

As a reminder to the plant as a whole, a large numeral to indicate the number of days the plant has operated without a man losing time because of an injury, is displayed at the main entrance. The numeral is changed daily.

In addition to the large numeral, each department maintains a similar departmental record to show the men within it the number of days each one of them has helped to run his department safely.

At present, there are ten departments showing that they have been able to operate free of any "lost-time" for periods of more than 1200 days. One department has operated more than 2500 days without any man suffering an injury which compelled him to leave work. There are 11 other departments whose operations have been from more than 300 to approximately 1000 days free of any disabling injury.

Accidents Immediately Investigated

Whenever an accident or near-accident occurs, the conditions are immediately investigated by a committee. The accident investigating committee, after its investigation at the site of the accident or near-accident, holds a session to determine the cause, in order to obviate a repetition. Accidents which occur in this plant, as well as any other plant, are discussed in detail in all departments in order to acquaint the men with causes and to further their education in accident prevention.

Safety shoes are worn by a large percentage of men, with the result that during 1934 there were no toe injuries causing lost time. Lack of mechanical guards has never been the source of an injury in this plant; in other words, the plant is mechanically safe. With a plant mechanically well guarded and with injuries being confined principally to handling of material, accident prevention education appears to be the most effective weapon in combating accidents. Republic Steel Corporation does not evade its responsibility toward accident prevention and never has evaded it. This corporation realizes that, if it is to stop accidents, it must make the training of men, as well as foremen and superintendents, continuous and continually advancing.

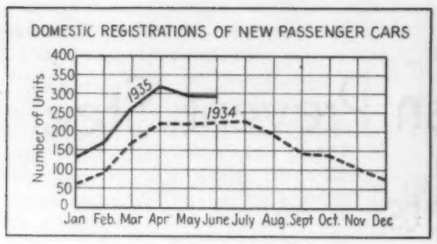
Ohio Foundry and Machine Works Merge

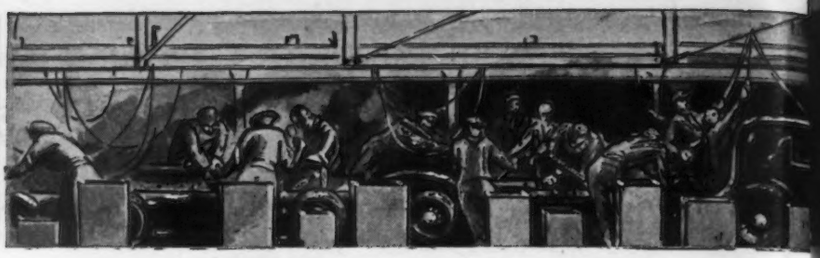
THE Hill Clutch Machine & Foundry. Co., 6400 Breakwater Avenue, Cleveland, has purchased all assets of the Canton Foundry & Machine Co., Canton, Ohio, which will continue to operate under its own name, but as a division of the Hill company.

The main offices of the Canton company will for the present remain at Canton, and the factory at 6400 Breakwater Avenue, Cleveland.

The Canton company manufactures all-steel alligator shears, portable cranes and industrial and automobile turntables.

Officers of the Canton division will be J. R. Bucher, president; A. C. McDaniel, vice-president, and Milo Firestone, secretary and treasurer.





THIS WEEK ON THE

Retail Sales Show Vigor as Industry Heads Into Retooling Period

DETROIT, July 9.

THE trooping of June retail car sales figures across the automotive stage might well be described, in revue language, as "a bevy of beauties." Those who anticipated that June would bring a seasonal slump, particularly in view of the thumping volume of sales earlier in the year, were pleasantly disappointed. From all sides pours in evidence of a remarkable month's business.

Records toppled like ten pins. Plymouth set an all-time high mark in retail deliveries the week ended June 29, with 10,244 units. It was the fourth week this year in which Plymouth's sales have exceeded 10,000 cars. During the same week Chrysler Corpn. as a whole hit a new high in retail sales, which are reported to have been more than 18,500 units.

Dodge dealers, in selling 9639 Plymouth and Dodge passenger cars and Dodge trucks the week ended June 29, had to go back to 1926 to discover a better week. Hudson and Terraplane orders that week amounted to 2403 cars, the second largest weekly total in 1935. Hudson's total retail deliveries last month were 7991 cars.

Buick, without having made any major change in its cars since early in 1934, sold 7033 units during June, of which 5238 were Model 40 jobs. It is notable that more Model 40 cars were delivered at retail last month than in the same month a year ago, when the series was new and ample stocks were first available to dealers.

Packard shattered all existing records by shipping 6513 cars from its local factories in June, the peak having been attained the final week, when 1862 cars were produced. Since Jan. 1, Packard has built 20,879 cars, compared with only 2565 in the same period of last year. This shows what the introduction of the One Twenty has done to lift Packard from the doldrums. Packard still is 3000 cars behind in furnishing dealers with adequate stocks. Its July schedule calls for 6400 cars. Not to be outdone by its leading competitor, Cadillac-LaSalle states that its June sales along the Pacific Coast were the best for any month during the last six years. Its retail business is running 52 per cent ahead of last year.

Quotas Being Increased

Significant of the healthy tone of the retail car market is the fact that the Chrysler management is understood to have decided in the last week to increase the quota of 1935 models to be built. Chevrolet, of course, is headed for 115,000 units in July, and is counting on operating at full speed right into the early part of August. Oldsmobile, too, is continuing to go at close to full capacity, hoping to have enough cars in dealers' hands by the middle of August to keep them supplied until 1936 models appear. Pontiac's field sales staff raised a rumpus when it heard about the number of cars it would get to clean up the present market. In fact, it yelled so loudly that the Pontiac management asked permission of General Motors to build an extra 7000 cars, according to reliable authority.

One should not forget that in the last three years the retail sales cycle has not conformed to the traditional idea that the peak must come in April or May. In 1934, July was the biggest sales month. The same was true in 1933, although allowance should be made that year because of a late start due to the bank holiday. In 1932, June was "the top." So it isn't so surprising, as it might seem offhand, for June to have surpassed May in retail passenger car sales, as indicated by preliminary reports. July should be a good month; however, no one expects it to equal June.

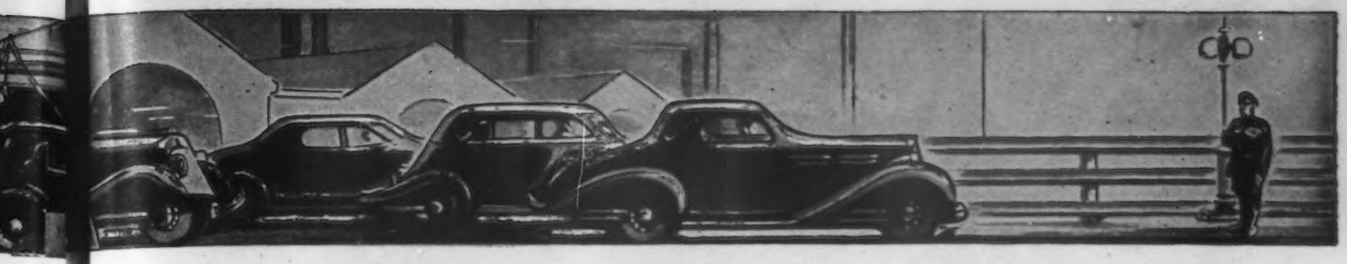
July Assemblies May Total 275,000

Assemblies this month should be at least 275,000 units. August and September appear to be the two weakest production months ahead. Many plants, probably including Ford, Pontiac, Oldsmobile, Hudson and the Chrysler divisions, are expected to be down sometime in August for retooling purposes. In some cases companies will be idle three to four weeks, although they are hoping to get started again with a minimum of delay.

August will witness the assembly of the first 1936 Buicks. Most companies, however, will not begin production of the new jobs until September, and some will not get under way until nearer Oct. 1.

Exact dates of public announcements of new cars will be determined partly by the length of time it may take dealers to liquidate present stocks. For this reason introductions will be later than originally planned in the case of at least two companies.

The New York Show, from Nov. 2 to 9, will again be under the direct management and control of



ASSEMBLY LINE

BY BURNHAM FINNEY

Detroit Editor, The Iron Age

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the Automobile Manufacturers' Association. On the heels of the national show will come the local shows, the Chicago show remaining in the classification of a "local."

New Car Stocks Normal

New car stocks around the country are mostly in good shape. Plymouth built 264,000 cars in the first half of the year and sold at retail 214,000 cars, leaving the number in dealers' hands at 50,000. At the rate of Plymouth's sales every week since March, this is only a five to six weeks' supply. Buick's field stocks on July 1 were below the figure anticipated by the management. Chevrolet and Oldsmobile have been experiencing trouble keeping abreast of retail demands, while Pontiac only recently has caught up with orders.

Chrysler Corpn. established an enviable record during the first half of 1935. It shipped 486,578 units, or 25 per cent more than in the similar period of 1934 and more than in the entire year of 1933. During the second quarter its production totaled 237,330 units, or within 12,000 of its all-time peak in the first quarter. In June it built 65,346 cars. In the first six months of this year its various divisions turned out cars as follows:

Plymouth	264,000
Dodge (passenger)	125,836
De Soto	21,778
Chrysler	35,003
Commercial cars, trucks and buses	39,675

Three Airstream cars were sold for every Airflow. It is the addition of the more conservative Airstream series, then, which enabled the Chrysler and De Soto divisions to show a substantial gain over last year.

Machinery Demand Active

If automotive demand can be taken as an accurate barometer, the machine tool industry is in for a period of balmy business. Initial orders are being placed in the $5,000,000 buying program at the local gear and axle plant of Chevrolet. Pontiac is starting to make purchases which, for all types of equipment and machinery, may total $1,000,000. Chevrolet's expenditures at Flint are by no means completed. Ford scarcely ever can be said to be out of the market, and recently has bought considerable equipment to be installed at the Rouge plant.

Plymouth is building four additions to its Detroit plant, giving it total floor space of nearly 1,000,000 sq. ft. The new space will be used to store bodies and to house such non-productive departments as factory maintenance, tool rooms, machine repairs and shop supplies. This will give more room on production lines to increase the capacity for the manufacture of motors and other parts to 2400 units a day.

Efficiency Car Provided

Responding to a demand from fleet operators for a car stressing economy rather than any other feature, a prominent manufacturer in the lowest-price field is introducing in both its passenger and commercial cars a new line designed to give 25 per cent better efficiency in gas and oil mileage. The car has as optional equipment two speed governors with a top limit of 50 or 65 miles an hr., according to the wishes of the owner and has a high gear ratio of 3.82 instead of 4.11, reducing the engine r.p.m. 8 per cent at any road speed. No publicity or advertising is accompanying the introduction of this line since it is intended to meet the specific needs of what presumably is a limited market.

Concurrent with this development comes word that a new company headed by R. S. Evans of Atlanta, Ga., is planning to seek court permission to take over the American Austin plant at Butler, Pa., and build in the next year 6000 small cars of new design differing materially from the former Austin car.

It is anticipated that the Federal Court at Toledo, Ohio, will grant permission to the Willys-Overland Co. to manufacture 10,000 more of its Willys 77 jobs. The company is now cleaning up the production of 15,000 cars already authorized by the court.

Additional Material Ordered

The continued strength shown by retail sales has made it necessary for several companies to make fresh steel and parts commitments. Ford is reported to be planning on shutting down the Rouge plant for at least two weeks around Aug. 1 for retooling purposes. It will not be in the market for steel until about Aug. 15 or perhaps later.

Pig Iron Still Active

Surprising the trade, pig iron shipments thus far in July have run ahead of the same period last month. This has been due partly to the demand from such automotive foundries as Chevrolet, Dodge and Packard and partly to increased melt by jobbing foundries engaged in casting dies for 1935 automotive production. The Chevrolet gray iron foundry at Saginaw ran five days last week pausing only for the Fourth holiday and melting 2000 tons a day.

Midland Steel Products Co., Cleveland, again will participate heavily in the Chrysler frame business which it has divided the past year with A. O. Smith Corpn., Milwaukee. The Michigan Bumper Co., Grand Rapids, Mich., will supply all of Buick's bumpers and part of Oldsmobile's requirements the coming year. It is understood that both Dodge and Plymouth will have metal spring covers on their 1936 cars. Packard and Pontiac have bought steel the past week for current models.

VISION —— "There's Gold

Prospectors of Old found Gold in "Them Thar Hills".

Today, Industrial Prospectors are also looking for Gold. The Vision of the Modern Prospectors, aided by the Vision of Engineering, makes it possible for Industry to obtain Gold through manufacturing Efficiency, Savings and Productability of machine equipment.

Bullard offers Small Type "J" Mult-Au-Matic for those small high-speed jobs and the large Type "D" Mult-Au-Matic for those heavier, fast jobs.

Bullard Single Spindle Vertical Automatic Lathe, characterized by Flex-Au-Mobility provides a means of manufacturing economy in Single Unit or Battery installations of

THE BULLARD COMPANY

in Them Thar Hills"

hose jobs of lower production volume and frequent or occasional "change-over".

Every Job has within it that Gold known as "Better Profits". The wise Prospector selects the Best Method for getting his share.

Let Bullard Grub-Stake you to surveys of your requirements, and then supply your Method for getting that Gold — Your Better share of available Profits.

The machines illustrated here will be in operation for your approval at the National Machine Tool Builders' Show — Cleveland Auditorium — September 10 to 21 — Bullard Booth 205.

BRIDGEPORT, CONNECTICUT

NEWS OF THE WEEK

Youngstown Sheet & Tube's New Cold Strip Mill Is Nearing Completion

THE new continuous cold strip mill which the Youngstown Sheet & Tube Co. is building as an adjunct to its new hot mill at Campbell works is now practically completed and is expected to be put in operation during the next few weeks.

The new cold mill is a three-stand, four-high continuous unit which will roll up to 72 in. wide, with a capacity of from 150 to 200 tons a turn.

A continuous pickling unit leads from the end of the hot mill to the cold mill. Coiled strip from the hot mill is placed on a coil box and unwound, passing through a flattener, then through shears which trim off the uneven ends, and thence through a stitcher which stitches the end of each strip to the next. This makes the pickling a continuous process. The strip travels through the pickling tanks at about 80 ft. a min. The pickling unit is about 350 ft. long, including both the acid tanks and the wash tanks.

After pickling, the strip passes through shears which shear off the stitches, and the strip is then recoiled and carried by conveyor to the cold mill delivery table.

One of the most interesting features of the mill is the length of the coils of steel rolled. A typical coil as it comes from the hot mill to the cold mill may be ⅛ in. thick and 500 ft. long. The cold mill may bring this down to a thickness of 0.05 of an in., and in the reduction process elongate the coil to 1200 ft. This single strip of steel starts originally in the hot mill furnace as a slab not more than 10 to 12 ft. long and about 6 in. thick. The reduction to 0.05 of an in. in thickness and elongation to 1200 ft. in length is accomplished by passing the steel through 13 sets of rolls—10 in the hot mill and three in the cold mill.

After rolling, sheets are cut to desired widths by a side shear, roller leveled and then cut to desired lengths by a flying shear. Sheets designed for stamping or forming are then box-annealed to give them the desired temper and drawing qualities. After box annealing, they are given a "skin pass" through a single stand of rolls to perfect surface qualities and relieve strains, and again roller leveled. After testing and inspecting, they are ready to be shipped.

In addition to equipment above mentioned, the mill contains a single stand 93 in. wide with which the company is planning to pioneer in the rolling of sheets up to a width of 90 in.

This will be done by cross rolling.

In commenting on the process, Frank Purnell, president of the company, said that the 93-in. single stand "rolling 90-in. sheets is still in the experimental stage, but we believe we can work out this problem satisfactorily In the automobile field especially, there is a growing demand for wider sheets, and we want to be able to anticipate manufacturers' requirements in this direction."

Construction of the cold mill was begun about the first of this year and, like the hot mill, has been completed in record time. The hot mill was begun in July, 1934, and sheets were rolled on it in March, 1935. The hot mill and the cold mill take up more than 12 acres, and represent one of the largest durable goods projects undertaken in this country during the last year.

Pabst Orders Beer Cans; Lice Cut Pea Canning Pack

PREMIER - PABST CORPN., Milwaukee (formerly Pabst Brewing Co.), has contracted with American Can Co. for its requirements of containers for beer and already has completed installation of special equipment for handling the new product. It has not been possible to get even an estimate of the probable tonnage involved.

However, with the tin plate industry sure to profit from this new form of outlet, it is likely to get a temporary jolt this season from the pea canning industry, in which Wisconsin is one of the leaders. Aphids (pea lice) are ravaging the crop this year. H. R. Burr, secretary of the Wisconsin Canners Association, said that the lice have already cut the crop, originally estimated at between 20,000,000 and 25,000,000 cases, practically in half. Unfavorable growing weather not only helped reduce the crop, but has delayed the canning season so that during the first

week in July, when normally the pack of early peas is over, the pack is just commencing.

It is said that the other major producing states, New York and Michigan, are also infected, and Illinois and Minnesota damaged but not nearly so badly as the others.

German Steel Output at Highest Level Since 1928—Export Goal Approached

HAMBURG, July 1 (*By Special Correspondence*). — German steel production rose to 1,314,525 tons in May, the highest total since 1928. This compares with 1,223,476 tons in April and with 898,510 tons in May, 1934, the latter, however, not including the Saar. The Saar production was 174,803 in May, 1935, and 151,311 tons in May, 1934. Production of Thomas steel in May was 541,064 tons, and of open-hearth steel 696,565 tons, the remainder consisting of electric and other grades.

The German steel industry is now operating at 78 to 80 per cent of theoretical capacity. Orders are continuing in good volume and output will likely be maintained or even increased. Exports are averaging nearly 100,000 tons a month more than in 1934 and the goal of 325,000 tons monthly will probably soon be reached.

Barter transactions continue heavy and German allotments for wire rods, hoops and bars have been exhausted. Demand for broad flange beams is particularly heavy. Continental-British steel negotiations and agreements have had little effect upon the German markets, and far more importance is attached to the Polish-German negotiations. A report that the Continental-British steel tube cartel will be renewed is premature. However, a mutual market protection agreement among the Continental steel tube manufacturers has been concluded.

Machinery Makers Busy

The Federation of German Machinery Manufacturers reports that operations have risen 1½ points to 74 per cent of full capacity. Export demand for metal working, internal combustion machinery and textile machinery is heavier, but a decline in orders for other industrial machines is reported.

Unfilled orders of shipyards have increased to approximately 237,000 tons, compared with 212,400 tons in March and are 92,000 tons ahead of the same time last year. Approximately 42 per cent of the total tonnage is for foreign account. The British-German naval agreement will have no immediate effect upon warship construction. The present submarine building program includes twelve of 250 tons and twelve of 600 tons, and plans for the construction of twelve to 18 destroyers and two to three cruisers are under way. No battleships are contemplated at the moment.

The Italian armament industry has placed rather heavy orders for special steel with Swedish steel works. These include more than 12,000 tons for guns, shields and ammunition.

Unemployment Still High

The number of unemployed in Germany, including the Saar, during May was about 2,000,000. Of this total only 910,000 were entirely idle. The "holiday steamers" of the Kraft durch Freude organization have already taken 105,000 workmen on sea cruises this year and the total will mount to 220,000. The excursions are paid by monthly contribution which every workman is paying and which gives him the right to take cheap trips either on sea or land. This year over 3,000,000 workmen will make use of these facilities. A trip from Berlin via Hamburg to the Isle of Wight and back via Holland costs the workmen including full meals only 42 marks and a journey to Spitzbergen and Iceland only 48 to 50 marks.

Steel Output Drops Further in June—Six Months' Production Near Last Year's

PRODUCTION of Bessemer and open-hearth steel ingots during June was 2,230,893 gross tons, according to the American Iron and Steel Institute. Averaging 89,236 tons per day, the rate for the month was 40.31 per cent of the country's capacity.

May output was 2,635,857 tons (revised), or 97,624 tons per day, equivalent to 44.10 per cent of capacity. In June, 1934, the industry made 3,059,483 tons, or 117,672 tons daily, equivalent to 53.44 per cent of capacity.

REPORTED BY COMPANIES WHICH IN 1934 MADE 97.91 PER CENT OF THE OPEN-HEARTH AND 100 PER CENT OF THE BESSEMER INGOT PRODUCTION

	Reported Production (Gross Tons)		Calculated Monthly Production—All Companies		Number of Working Days	Per Cent of Operation
1934	Open-Hearth	Bessemer	Monthly	Daily		
January	1,786,458*	172,489	1,997,129†	73,968†	27	33.59†
February	1,993,465*	175,873	2,211,944†	92,164†	24	41.86†
March	2,540,243*	203,904	2,798,440†	103,646†	27	47.07†
April	2,622,531*	257,482	2,936,064†	117,443†	25	53.34†
May	3,003,676*	331,620	3,399,494†	125,907†	27	57.18†
June	2,718,782*	282,592	3,059,483†	117,672†	26	53.44†
Six months	14,665,155*	1,423,960	16,402,554†	105,145†	156	47.75†
July	1,340,924*	119,869	1,489,453†	59,578†	25	27.06†
August	1,245,139*	109,598	1,381,350†	51,161†	27	23.24†
September	1,127,269*	117,615*	1,268,977†	50,759†	25	23.05†
October	1,325,777*	127,789	1,481,902†	54,885†	27	24.93†
November	1,447,626*	132,059	1,610,625†	61,947†	26	28.13†
December	1,794,437*	131,467*	1,964,257†	78,570†	25	35.68†
Total	22,946,327*	2,162,357*	25,599,118†	82,312†	311	37.38†
1935						
January	2,576,671	239,858	2,871,531*	106,353*	27	48.04*
February	2,500,062	224,336	2,777,765*	115,740*	24	52.28*
March	2,582,211	230,810	2,868,141*	110,313*	26	49.82*
April	2,358,249	231,916	2,640,504*	101,558*	26	45.87*
May	2,331,297	254,796	2,635,857*	97,624*	27	44.10*
June	1,978,180	210,487	2,230,893	89,236	25	40.31
Six months	14,326,670	1,392,203	16,024,691	103,385	155	46.70

*Revised.
†Adjusted.

Steel Corporation Subsidiary Has Perfect Safety Record

THE Buffington, Ind., plant of the Universal Atlas Cement Co., United States Steel Corpn. subsidiary, was awarded the Portland Cement Association safety trophy, with appropriate ceremonies, on June 27. The trophy was offered for the first time in 1923 to the mill organization which operated throughout the year with the lowest number of accidents. One year later it was awarded for the first time to a mill which came through 12 months with its record unmarred, and since that time it has been given only to plants having perfect safety records.

The Buffington plant operated throughout the whole of the calendar year 1934 without a single member of the organization having lost any time as a result of an industrial accident.

Arthur H. Young, vice-president of the United States Steel Corpn., who was one of the speakers and who is shown in the picture, recalled that organized accident prevention work originated in Joilet works and South works of the Illinois Steel Co., a sister organization, in 1905. To illustrate the contrast between safety work, as now practiced, and conditions that formerly prevailed, he recounted preventable accidents that occurred in steel mills at the time that he first became a mill laborer as a boy under 15 years of age.

W. A. Irvin, president of the United States Steel Corpn., in a letter of congratulation to B. F. Affleck, president, Universal Atlas Cement Co., said in part:

I do not believe that there is another large industrial corporation in this country, or in the world, that can fairly say that, for the full span of 30 years, they have persistently and consistently carried on with organized safety effort. The United States Steel Corpn. is universally acknowledged as the pioneer in this field, and for a full generation we have led the world in the accomplishment of industrial accident prevention. . . . For the corporation, our efforts and expenditures have been economically justified, but far beyond that value is the demonstration that men and management, working together for a common goal, can, because of their commonality of interest and their voluntary and wholehearted, purposeful effort, successfully meet the major problems of industry.

Former mill laborer recalls "good" old days

TRADE NOTES

Pittsburgh Steel Co., Pittsburgh, has appointed Tubular Service Corpn., 120 Forty-fourth Street (Bush Terminal No. 25), Brooklyn; 721-727 Sedgley Avenue, Philadelphia; and 23-25 Purchase Street, Boston, as distributer of seamless steel boiler tubes and other pressure tubes in the New England and North Atlantic States.

Farrel-Birmingham Co., Inc., Buffalo, announces it has appointed Sterling-French Machinery Co., New Center Building, Detroit, as sales representative for the Sykes gear generators in the Detroit territory.

Marr-Galbreath Machinery Co., Pittsburgh, has purchased entire plant of Lincoln Scale Corpn., Latrobe, Pa., consisting of modern machines, motor driven, as well as all small tools. All machines are available for immediate disposal.

Harmer Steel Products & Supply Co., Portland, Ore., has moved its warehouse and offices to 138 S. W. First Avenue.

Roxalin Flexible Lacquer Co., Elizabeth, N. J., has established office at 1616 Kresge Building, Detroit. Roy St. John has been appointed technical sales representative in charge of Detroit office.

S. G. Monce, Inc., will remove plant from Unionville, Conn., to Bristol, Conn., in near future. Bristol was original home and office of this company from 1869-1896. Company is now under entirely new management.

Trade Publications

Aluminum Alloys. — Aluminum Co. of America, Pittsburgh. Revised edition of the booklet "Alcoa Aluminum and Its Alloys," 91 pages, covering wrought alloys of aluminum and their physical properties, corrosion resistance, heat treatment, etc.; and aluminum casting alloys, including permanent mold castings. A 37-page appendix is devoted to tables of physical properties, compositions, typical mechanical properties, dimension tolerances and available commercial sizes of aluminum alloy products.

Dust Catching Equipment. United States Hoffman Machinery Corpn., Air Appliance Division, 105 Fourth Avenue, New York. Catalog A-182 dealing with company's heavy-duty, vacuum-cleaning equipment for foundry installations. Actual cleaning operations are shown together with methods for handling especially difficult situations.

Motor Brushes. Ohio Carbon Co., 12508 Berea Road, Lakewood, Ohio. New edition of company's booklet, entitled "The Brush Phase of Motor Maintenance," which has been brought up to date by series of illustrations showing testing systems for maintaining quality standards.

Summer Lull Not Apparent In British Iron and Steel Market

LONDON, July 8. (*By Cable*).—Exports are quiet, but home trade is active without signs of usual summer apathy. Home demand for pig iron is active and supplies are insufficient. Italian orders for hematite have been refused owing to payment difficulties.

The Continent is offering semi-finished steel delivery after Aug. 8, when the new quota becomes operative, but British makers are busy and are receiving orders over the second half of the year.

Specifications for finished steel are steady and are mainly for construction materials. Small bar and strip mills are running full and the plate outlook is improving as more shipbuilding orders are placed under the Government's scrap and build scheme.

Tin plate has improved with substantial home booking up to the end of this year. Output is at 55 per cent of capacity, and unfilled orders are approaching and likely to exceed 3,000,000 boxes. Export business with the Continent, Canada, Australia and South America is fair and there has been a limited revival in Far Eastern demand.

Continental iron and steel markets continue dull. A revival in business with the United Kingdom is likely in August and better Indian seasonal buying is anticipated, but approaching holidays impede any all around improvement.

The London meeting of English makers and the Continental Cartel made considerable progress on sectional agreements and discussions are being resumed this week probably at Brussels.

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton

Ferromanganese, export	£9
Billets, open-hearth	£5 10s. to £5 15s.
Tin plate, per base box	*18s. 2d. to 19s.
Steel bars, open-hearth	£7 17½s.
Beams, open-hearth	£7 7½s.
Channels, open-hearth	£7 12½s.
Angles, open-hearth	£7 7½s.
Black sheets, No. 24 gage	£9 5s.
Galvanized sheets, No. 24 gage	£11 5s.

*To July 1; 18s. 5d. to 19s. 3d. thereafter.

Official Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £

Current dollar equivalent is ascertained by multiplying gold pound price by 124.14 to obtain franc equivalent and then converting at present rate of dollar-franc exchange

Billets, Thomas.	£2 7s.
Wire rods, No. 5 B.W.G.	£4 10s.
Steel bars, merchant	£3 5s.
Sheet bars	£2 8s.
Plate, ¼ in. and up	£4
Plate, 3/16 in. and 5 mm.	£4 2s. 6d.
Sheets, ⅛ in.	£4 7s. 6d.
Beams, Thomas.	£3 2s. 6d.
Angles (Basic)	£3 2s. 6d.
Hoops and strip base	£4 2s. 6d.
Wire, plain, No. 8	£5 7s. 6d.
Wire nails	£5 15s.
Wire, barbed, 4 pt. No. 10 B.W.G.	£8 15s.

Half of States Now Have Some Form Of Sales Tax — Enacted Since 1932

Sales tax laws are on the books of half the States in the Union, according to a survey completed by the National Industrial Conference Board. This represents a net increase of 21 States since April, 1932, when the board's previous survey was made. At that time only Mississippi, North Carolina, and West Virginia imposed retail or general sales taxes.

Most of the laws approved in the last few years have been adopted as temporary measures, their primary purpose being to afford some degree of relief to State governments confronted with serious fiscal problems.

The conference board points out that a characteristic of recent sales tax laws is their lack of uniformity. There is not even approximate similarity among the States in respect to taxable objects, exemptions, rates or rate schedules, and other features.

Two types of sales tax laws are on the books of South Dakota, Washington, and West Virginia. In South Dakota a retail sales tax will become effective on July 1, when the gross income tax expires. In Washington and West Virginia retail sales taxes are imposed simultaneously with taxes on a broader base.

Of the taxes now in effect three are classified as general sales taxes, two as gross receipts taxes, three as gross income taxes, and 17 as retail sales taxes, exclusive of the New Jersey and South Dakota retail sales tax laws which do not become effective until July 1. The States in the various classifications are as follows:

General sales taxes: Arizona, North Carolina, and Washington.

Gross receipts taxes: Mississippi and New Mexico.

Gross income taxes: Indiana, South Dakota, and West Virginia.

Retail sales taxes: Arkansas, California, Colorado, Idaho, Illinois, Iowa, Kentucky, Maryland, Michigan, Missouri, North Dakota, Ohio, Oklahoma, Utah, Washington, West Virginia, and Wyoming. After July 1, New Jersey and South Dakota will be included in this group as well.

Special Taxes Not Included

Special taxes measured by sales that are not included in this compilation are the New Mexico retail merchants' graduated tax, Pennsylvania mercantile license tax, Connecticut tax on unincorporated mercantile and manufacturing businesses, the Delaware merchants' and manufacturers' license taxes and the Louisiana license taxes, none of which are important sources of revenue or related to recent developments in the field of sales taxes.

The rates for State retail sales taxes now imposed vary from one-half of 1 per cent in Missouri to 3 per cent in Kentucky, Michigan and Ohio. In Illinois the rate will be increased from 2 per cent to 3 per cent on July 1. The most common rate is 2 per cent. With the exception of Utah which taxes malt products at a special rate of 10 per cent, the rates in the various States for retail sales taxes are uniform with respect to all taxable objects.

Taxable objects vary widely in the different States. California, Illinois, and Ohio tax sales of tangi-

(CONTINUED ON PAGE 97)

PERSONALS

ALBERT REICHMANN has been elected a vice-president of the American Bridge Co., with headquarters at Chicago, Ill. Mr. Reichmann was born in Dubuque, Iowa, and completed his technical education in Germany After short engagements as draftsman, with the Lassig Bridge & Iron Works and the American Bridge Works, he entered the service of the Chicago, Milwaukee & St. Paul Railway, assuming charge of the designing office under the direction of Mr. Onward Bates, then engineer and superintendent of bridges and buildings. He remained with the railroad six years.

In July, 1901, Mr. Reichmann was appointed division engineer of the American Bridge Co., in charge of all engineering in the western division. On April 1, 1931, he was appointed assistant chief engineer, which position he held until his recent election as vice-president He is a member of the American Society of Civil Engineers, American Railway Engineering Society and Western Society of Engineers

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CHARLES F. GOODRICH has been appointed chief engineer, American Bridge Co., succeeding RICHARD KHUEN, JR., who has retired after more than 41 years of service with the company. A native of Manchester, N. H., Mr. Goodrich has been associated with the company for 29 years. After being graduated from Dartmouth College and the Thayer School of Civil Engineering, he started as draftsman in the Trenton, N. J., plant and advanced through the engineering department, becoming assistant chief engineer in 1933, at New York. His new headquarters will be at Pittsburgh.

Mr. Khuen was born in Saginaw, Mich., and was formally educated at the University of Michigan. He became engaged in engineering work with George S. Morrison, Erie Railroad and Philadelphia Elevated Railroad Co. until July 27, 1893, when he entered the service of A. & P. Roberts Co. (Pencoyd Iron Works), where he was in the engineering department of the bridge and structural division as designer and estimator. When the Roberts company was merged with the American Bridge Co., he was on the designing staff of the vice-president in charge of engineering. He was later transferred to Pittsburgh as division engineer and remained in that position until 1914, when he was appointed general manager of erection. He retained that appointment until 1931, when he was appointed chief engineer.

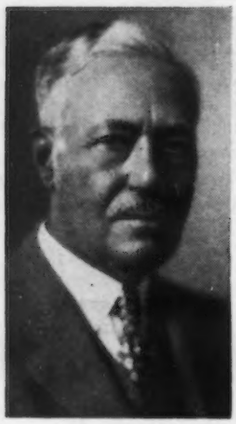

Photo by Toloff

A. REICHMANN

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C. E. WEBB has been appointed division engineer, with headquarters at Chicago, by the American Bridge Co. He was graduated in 1912 from Michigan State University, and his first work was with the Reclamation Service at Fort Shaw, Mont., where he remained two years. In 1914 he went to the Gary plant of the American Bridge Co. as a draftsman. After several promotions he was sent in 1922 to the Chicago office as a designer. In 1930 he was made engineer in charge of bridge design. He holds membership in the American Society of Civil Engineers, Western Society of Engineers and the American Railway Engineering Association.

C. E. WEBB

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P. J. POTTER, heretofore second vice-president of the Panborn Corpn., Hagerstown, Md., has been elected a director and vice-president of the company and will be in charge of engineering, sales and production. He joined the company in 1915 as sales representative for the Middle West and Pacific Coast territory and seven years later was made works manager of the foundry and manufacturing plant. VICTOR F. STINE, who has been with the company for 23 years and who was recently elected second vice-president, has been made sales manager.

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ARCH MILLER has been made packing representative in the Pittsburgh district for United States Rubber Products, Inc., Pittsburgh.

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C. R. PAYNE, formerly on the research staff of the Mellon Institute of Industrial Research, has been placed in charge of the production and development of plastic sulphur compounds or cements by the Atlas Mineral Products Co., Mertztown, Pa.

❖ ❖ ❖

DAVID HILL, who has been identified for over 20 years with the foundry equipment industry, has joined the engineering staff of the Beardsley & Piper Co., Chicago.

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W. W. SPANGLER has been appointed credit manager of Westinghouse Electric & Mfg. Co., with headquarters at East Pittsburgh. He has been with the company since 1916, having held various positions, including that of assistant manager, department of syndication operations, supervisor of commercial research and a member of the executive staff of the vice-president in charge of sales in the New York office.

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DR. IRVING LANGMUIR, associate director of the General Electric Research Laboratory at Schenectady, has been elected to foreign membership in the Royal Society, England. Foreign membership, considered one of the highest honors that can be bestowed by British scientists on fellow workers in other countries, is limited to 50 persons throughout the world. Dr. Langmuir, Nobel prize winner, is one of eight Americans now foreign members of the Royal Society, and is the only American industrial scientist so honored.

THIS group was photographed at the dinner. Reading from left to right, seated, are George Thomas, III, treasurer, Robert W. Wolcott, president, whose wife is the great-great-granddaughter of the founder, C. L. Huston, first vice-president of the company and great-grandson of the founder, who first worked at the mill as a clerk and has been with the company continuously for 60 years, W. J. Bassett, comptroller. Standing, left to right, are J. H. McElhinney, general superintendent, Darwin S. Wolcott, vice-president, Robert W. Moffett, president of By-Products Steel Corpn., division of Lukens, H. B. Spackman, director, who served the company 48 years, G. D. Spackman, president of Lukenweld, Inc., division of Lukens Steel Co.; Hugh Kenworthy, purchasing agent, and F. H. Gordon, vice-president in charge of sales, who started with the company 40 years ago as office boy.

Lukens Steel Co. Honored At Community Banquet

OFFICIALS of the Lukens Steel Co. and the 235 employees of the company who have continuous employment records of 25 years or more were tendered a banquet, July 2, by the city of Coatesville and a number of civic organizations.

The occasion was the 125th anniversary of the company, whose continuous progress under single family ownership was recorded in the July 4 issue of THE IRON AGE. It was held at the Coatesville Y. W. C. A., with Mayor William G. Gordon presiding. The principal address was made by C. L. Bardo, president of the National Association of Manufacturers.

Other speakers included Robert W. Wolcott, president, Lukens Steel Co.; C. L. Huston, first vice-president of the company; William H. Martin, who spoke for the employees; E. L. Shaner, editor of *Steel*, and John H. Van Deventer, editor of THE IRON AGE.

Changes in World Wage Levels Studied

THE competitive advantage that certain foreign countries, including Germany, Italy and Belgium, enjoy over the United States is indicated in a comparison of changes in American and foreign wage levels since 1929 made by the National Industrial Conference Board.

Changes in the United States, while the NRA code system was in effect, involved an increase in production costs in comparison with those of competing countries.

A comparison of wages in different countries is beset with numerous difficulties, the board pointed out, but added that the general trend can be indicated and that these trends can be compared. Although other factors need to be considered when direct comparisons are made, hourly wage rates or earnings in themselves furnish some indication of labor costs.

American average hourly earnings in manufacturing dropped 17 per cent from 1929 to 1933, but recovered in 1934 to a point only 1 per cent below that of 1929. To the extent that the decline in hourly earnings in foreign countries exceeds the decline in the United States the difference represents a competitive advantage held by those countries.

The following table shows the percentage changes in the general level of wage rates and earnings in the United States and various countries from 1929 to 1934:

Poland	—26
Germany	—21
Italy	—18
Belgium	—14
Canada	—11
Estonia	—10
United States	— 1

For five countries the latest available data are for 1933 only. The percentage changes from the 1929 level in these countries are shown below:

Australia	—19
Hungary	—16
Netherlands	—11
Switzerland	— 3
Sweden	— 2

Manganese Extras for Silvery Changed

MANGANESE differentials for silvery and Bessemer ferrosilicon iron, f.o.b. Jackson, Ohio, have been changed. Under the new schedule there is an addition of $1 per ton for 2 to 3 per cent manganese, and $1 per ton additional is charged for each unit of manganese over 3 per cent.

▲▲▲ Capital Goods Index

ACTIVITY in the capital goods industries declined during the first week in July to an estimated figure of 50.3, the low point, thus far, for the year. This is only slightly below the previous low point of 51.7, reached early in May, but it represents a decline of 17.7 points or 26 per cent from the peak of 68.0 established in February. Too much significance should not be attached to this sharp drop since the week included the July 4 holiday. Although the component series of the index are corrected so far as possible for the effect of holidays, special shutdowns in some industries affected the index more than is usual in prosperous years. A similar and even more drastic decline occurred in 1934.

The change in THE IRON AGE index reflects considerable declines in three of its components: ingot operating rates in the steel industry, automobile production and productive activity in the Pittsburgh district. Lumber production, on the other hand, remained the same as in the preceding week, and heavy construction contract awards were only fractionally lower.

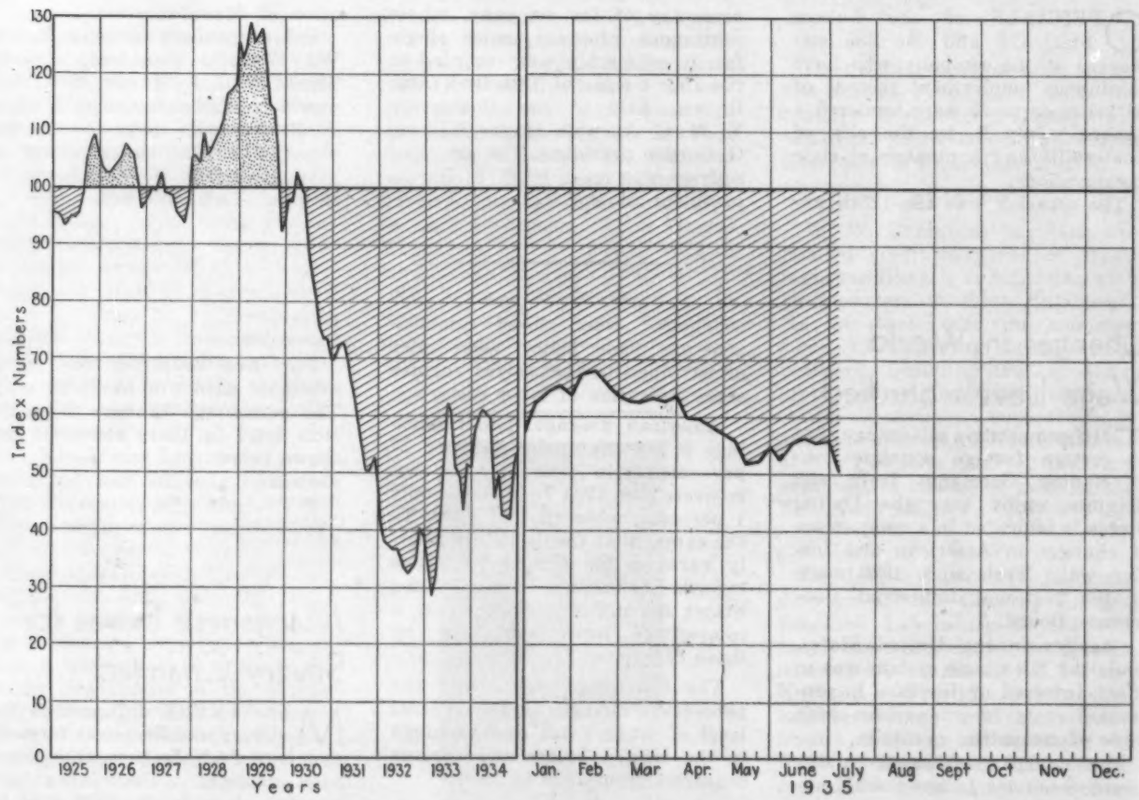
The Iron Age Weekly Index Numbers of Capital Goods Activity

(1925-27 Average = 100)

Last week (est.)	50.3
Preceding week (rev.)	55.9
Same week last month	52.2
Same week 1934	41.3
Same week 1933	59.3
Same week 1932	35.7
Same week 1931	64.8
Same week 1930	92.7
Same week 1929	122.3

Recovery in United States Lags

The rather erratic and lagging course of recovery in the United States is apparent from the charts on the opposite page, which compare the trends of unemployment and industrial production in the United States and the world during the past several years. The index of world unemployment, which is based chiefly on public employment office records, unemployment insurance registration and other official data for the principal industrial countries, is not strictly comparable with the American figures, which are estimates of the number of unemployed based on monthly fluctuations in employment. The two curves have been placed on a comparable basis with



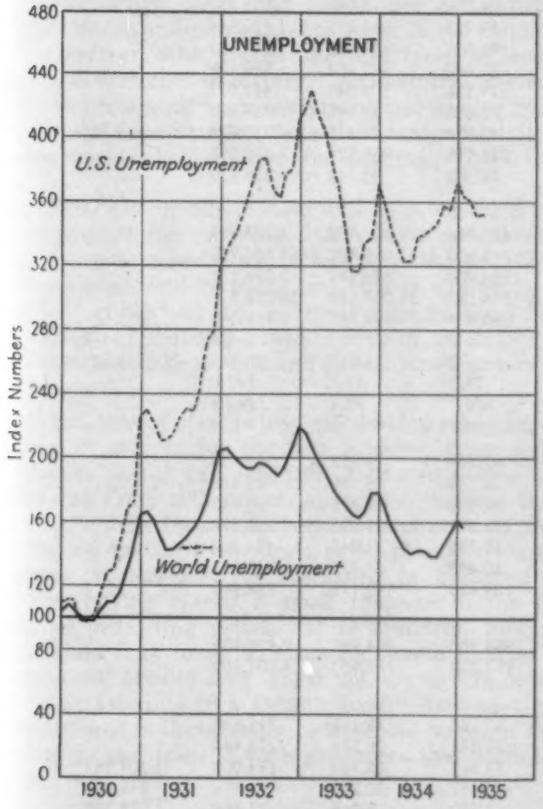
The Iron Age Index of Capital Goods Activity. The years 1925 to 1934 are plotted by months, the current year by weeks.

Shows Sharp Decline ▲▲▲

the number of unemployed in April, 1930 (the date of the United States Census of Unemployment), as 100. Unemployment increased steadily, with seasonal variations, until the winter of 1932-33. At the peak, unemployment in the United States was more than four times as great as in April, 1930, while world unemployment had little more than doubled. Substantial improvement has since occurred, but with a reduction in world unemployment of 28 per cent as compared with only 15 per cent for the United States.

The chart of industrial production shows a similar tendency for recovery in the United States to lag behind that of other industrial countries. World production fell by about 35 per cent from the peak of the boom in 1929 to the low point in July, 1932, while the decline in American industrial production was nearly 50 per cent.

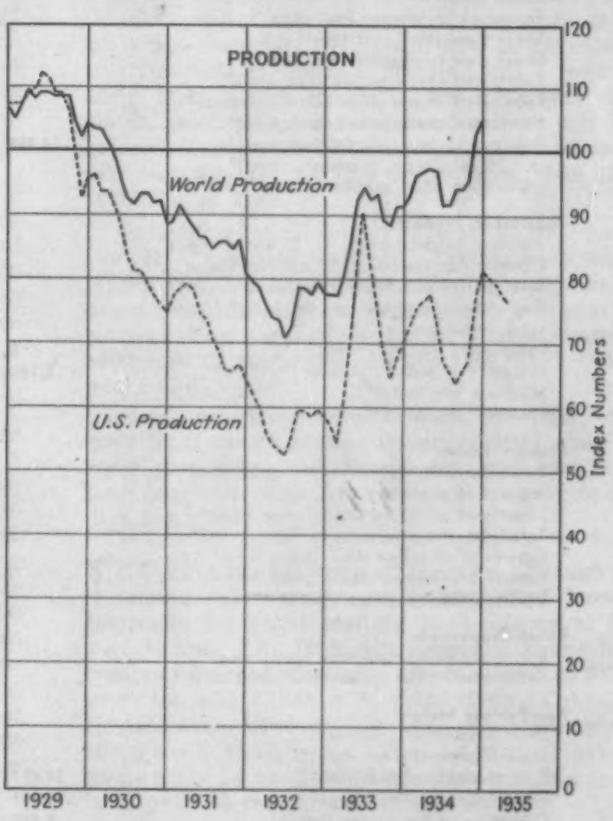
It is significant that the turning point came at the same time in nearly all countries. By the beginning of 1935 world production had reached 105 per cent of the 1928 average. Production in the United States, on the other hand, after a spectacular rise in the middle of 1933 to 90 per cent of the 1928 average, dropped back to 81 per cent at the beginning of 1935 and has since fallen to 76.6 per cent. In other words, world production has recovered 88 per cent of the ground lost between the 1929 peak and the low point of 1932, while United States production, which at the beginning of 1935 had regained 48 per cent, has slipped back to a position which represents recovery of about 40 per cent of the ground lost since the production peak of 1929. The evidence presented in these two charts indicates that not only was the depression more severe in the United States, which was partially due to the fact that the preceding boom was more pronounced, but the recovery has been more erratic and of smaller extent than in the world as a whole. This rather unsatisfactory record raises at least some question as to whether the modest recovery in the United States has been achieved because of the recovery program or in spite of it.



UNEMPLOYMENT IN UNITED STATES AND WORLD

(April 1930 = 100)

Sources: Unemployment in United States: monthly estimates of A. F. of L. from 1930 to 1934, IRON AGE estimates for 1935; World unemployment: *International Labor Review.*



INDUSTRIAL PRODUCTION IN UNITED STATES AND WORLD

(1928 average = 100)

Sources: World Industrial Production: Institut für Konjunkturforschung, based on data collected by League of Nations; United States Industrial Production: Index of Federal Reserve Board.

Current Metal Working Activity Statistically Shown

These Data Are Assembled By THE IRON AGE from Recognized Sources And Are Changed Regularly As More Recent Figures Are Made Available. Boldface Type Indicates Changes This Week

	June, 1935	May, 1935	June, 1934	First Half, 1934	First Half 1935
Raw Materials:					
Lake ore consumption (gross tons)[a]	.....	2,466,585	2,721,449	13,723,119	.....
Coke production (net tons)[b]	.....	2,850,236	3,049,700	17,589,203	.....
Pig Iron:					
Pig iron output—monthly (gross tons)[c]	**1,552,514**	1,727,095	1,930,133	9,798,313	9,799,000
Pig iron output—daily (gross tons)[c]	**54,138**	55,713	64,388	54,134	54,138
Castings:					
Malleable castings—production (net tons)[d]	.....	34,729	28,340	214,041	.....
Malleable castings—orders (net tons)[d]	.....	**31,136**	24,449	207,647	.....
Steel castings—production (net tons)[d]	.....	**30,646**	50,286	249,484	.....
Steel castings—orders (net tons)[d]	.....	**29,083**	41,537	273,550	.....
Steel Ingots:					
Steel ingot production—monthly (gross tons)[e]	**2,230,893**	2,635,857	3,059,483	16,402,554	16,024,691
Steel ingot production—daily (gross tons)[e]	**89,236**	97,624	117,672	105,145	103,385
Steel ingot production—per cent of capacity[e]	**40.31**	44.10	53.44	47.75	46.70
Employment in Steel Industry:					
Total employees[e]	.....	420,470	455,966	429,834	.....
Total payrolls (thousands of dollars)[e]	.....	46,494	49,467	258,401	.....
Average hours worked per week[e]	.....	33.9	36.2	34.1	.....
Finished Steel:					
Trackwork shipments (net tons)[e]	.....	4,228	6,184	28,647	.....
Sheet steel sales (net tons)[f]	.....	149,725	114,855	1,185,644	.....
Sheet steel production (net tons)[f]	.....	191,507	199,438	1,249,231	.....
Fabricated shape orders (net tons)[g]	.....	55,600	122,603	595,188	.....
Fabricated shape shipments (net tons)[g]	.....	79,336	104,041	462,071	.....
Fabricated plate orders (net tons)[d]	.....	17,630	27,395	138,833	.....
Reinforcing bar awards (net tons)[e]	**14,985**	12,080	21,315	110,885	112,755
U. S. Steel Corpn. shipments (tons)[h]	.....	598,915	985,337	3,678,895	.....
Ohio River steel shipments (net tons)[i]	.....	78,106	83,718	336,432	.....
Fabricated Products:					
Automobile production, U. S. and Canada[k]	.....	385,486	321,970	1,796,423	.....
Construction contracts, 37 Eastern States[l]	.....	$126,718,600	$127,055,400	$854,101,900	.....
Steel barrel shipments (number)[d]	.....	554,102	696,349	3,826,114	.....
Steel furniture shipments (dollars)[d]	.....	$1,214,163	$1,045,539	$5,836,711	.....
Steel boiler orders (sq. ft.)[d]	.....	640,824	359,749	1,916,040	.....
Locomotive orders (number)[m]	**3**	2	3	83	16
Freight car orders (number)[m]	**5,151**	2	1,217	23,383	6,583
Machine tool index[n]	.....	73.3	35.3	†42.6	.....
Foundry equipment index[o]	.....	100.7	70.4	†68.3	.....
Foreign Trade:					
Total iron and steel imports (gross tons)[p]	.....	47,719	24,858	167,638	.....
Imports of pig iron (gross tons)[p]	.....	23,174	5,168	65,386	.....
Imports of all rolled steel (gross tons)[p]	.....	18,905	11,818	55,980	.....
Total iron and steel exports (gross tons)[p]	.....	**286,599**	219,406	1,253,174	.....
Exports of all rolled steel (gross tons)[p]	.....	**65,255**	71,965	494,767	.....
Exports of finished steel (gross tons)[p]	.....	**60,487**	61,425	429,547	.....
Exports of scrap (gross tons)[p]	.....	**209,425**	143,115	738,848	.....
British Production:					
British pig iron production (gross tons)[r]	.....	558,900	514,900	2,898,400	.....
British steel ingot production (gross tons)[r]	.....	853,300	757,500	4,507,300	.....
Non-Ferrous Metals:					
Lead production (net tons)[s]	.....	37,358	33,218	213,697	.....
Lead shipments (net tons)[s]	.....	32,341	28,276	178,444	.....
Zinc production (net tons)[t]	**34,677**	34,597	25,160	184,008	209,987
Zinc shipments (net tons)[t]	**29,393**	35,652	30,217	189,896	215,083
Deliveries of tin (gross tons)[v]	**4,615**	3,950	3,845	22,445	28,390

*Preliminary. †Three Months' Average.

Sources of figures: [a] Lake Superior Iron Ore Association; [b] Bureau of Mines; [c] THE IRON AGE; [d] Bureau of the Census; [e] American Iron and Steel Institute; [f] National Association of Flat-Rolled Steel Manufacturers; [g] American Institute of Steel Construction; [h] United States Steel Corpn.; [i] United States Engineer, Pittsburgh; [k] When preliminary, from Automobile Manufacturers Association—Final figures from Bureau of the Census; [l] F. W. Dodge Corpn.; [m] *Railway Age;* [n] National Machine Tool Builders Association; [o] Foundry Equipment Manufacturers Association; [p] Department of Commerce; [r] British Iron and Steel Federation; [s] American Bureau of Metal Statistics; [t] American Zinc Institute, Inc.; [v] New York Commodities Exchange.

Post-Holiday Recovery Is Sharp; Output Rebounds to 36½ Per Cent

Industry Enters Second Half with Consumer Stocks Low—Automobile Maker Presses for Detroit Base—Scrap Strong—Connellsville Coke Declines

STEEL ingot output has rebounded to 36½ per cent of capacity, or only 1½ points short of the rate that prevailed in the last two weeks of June. The current operation compares with 27 per cent in the corresponding week of 1934. But the difference in the production pace does not fully measure the improvement in the industry's position over what it was a year ago. At that time producers' customers were loaded up with swollen inventories which had been accumulated in anticipation of price advances. Today buyers' stocks are relatively light and, in some instances, actually subnormal because of postponement of purchases for possible price advantage.

Other favorable factors are the sustained demand for automobiles, with July assemblies estimated at 275,000 units, and marked betterment in the condition of the farmer, who a year ago was faced by one of the worst droughts in history. Agricultural buying is not only sustaining farm equipment and tractor manufacture but is accounting for out-of-season activity in roofing sheets, barbed wire and fencing.

LEADING automobile makers will be down for a time in August for retooling, but volume purchases of steel for new models, which will get into production in September, will be made late this month or in the first half of next month. Current steel business from the motor car industry consists both of fill-in lots for final runs on 1935 models and initial small orders for 1936 cars.

A real test of steel prices will develop when buying sets in in earnest for the new models. Even now a prominent motor car producer is pressing steel suppliers for f.o.b. mill prices, apparently hoping to induce mills near Detroit to furnish steel at base prices equivalent to the Pittsburgh price plus a switching charge. It has not yet succeeded in breaking the market, having placed a small tonnage in the past week at prevailing prices. It is confident, however, that, when it is ready to place its fourth quarter requirements, around Aug. 15, it will succeed in obtaining what amounts to a Detroit base. As a means of persuasion it is threatening to withhold business from local mills and place it with producers that have long hauls.

TIN PLATE shipments in June assumed record proportions for some producers and, in the case of other mills, will reach an apex this month. Output has made an excellent recovery since the holiday interruption and now averages 65 per cent. Releases from can companies reflect the condition of packing crops, which are abundant except for peas, which have been ravaged by lice in a number of leading producing States. A contract placed by the Premier-Pabst Corpn., Milwaukee, with a can company for containers points to a marked expansion in the use of tin plate for beer cans.

New York City has placed orders for 5800 tons of cement-lined cast iron pipe and Los Angeles has opened bids on 3500 tons of cast pipe.

The Nickel Plate is in the market for 4000 tons of rails, while the Delaware, Lackawanna & Western has closed for 1500 to 2000 tons of maintenance track supplies.

PROSPECTS of larger tonnages from public works have been brightened by the exemption of Mississippi River improvements from the arbitrary rules of the Government concerning relative expenditures for labor and materials. Bids will now be taken on the river projects at the rate of about one a week until early fall. Large quantities of structural shapes, plates, sheet piling and reinforcing bars will be required. Tenders to be taken this week and next on two contracts for the Bonneville, Ore., dam involve 7800 tons of steel.

Structural steel lettings total 21,800 tons as against 7000 tons a week ago. Private work was well represented, leading awards including tonnages for a paper company plant, a brewery and two apartment houses. New projects of 19,500 tons compare with 9000 tons in the previous week and 56,675 tons two weeks ago.

Total awards, reported to date this year, of constructional steel, including structural steel, plate work, sheet steel piling and reinforcing steel, are 557,749 tons, compared with 687,419 tons in the corresponding period in 1934.

THE scrap market has a strong tone, although prices remain substantially unchanged. THE IRON AGE composite for heavy melting steel holding at $10.75 a gross ton. THE IRON AGE composite prices for pig iron and finished steel also are unaltered at $17.84 a gross ton and 2.124c. a lb. respectively. Connellsville furnace coke, however, has again declined, this time 10c. a ton to $3.25, ovens. The fuel markets have been demoralized by the flood of offerings that had accumulated prior to the threatened coal strike.

Our tariff on iron and steel products has again been lowered, this time by a reduction in duties on high-grade steels, effective Aug. 5, which follows the conclusion of a Swedish-American trade agreement.

Iron and steel exports in May totaled 286,599 tons as against 205,336 tons in April, a gain of 39.6 per cent. The bulk of outgoing shipments consisted of scrap, the May total for old material being 209,425 tons, compared with 131,731 tons for April.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous; Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

Per Gross Ton:	July 9, 1935	July 2, 1935	June 11, 1935	July 10, 1934
No. 2 fdy., Philadelphia	$20.31	$20.31	$20.31	$20.26
No. 2, Valley furnace	18.50	18.50	18.50	18.50
No. 2 Southern, Cin'ti	19.2007	19.2007	19.2007	19.13
No. 2, Birmingham†	14.50	14.50	14.50	14.50
No. 2 foundry, Chicago*	18.50	18.50	18.50	18.50
Basic, del'd eastern Pa.	19.81	19.81	19.81	19.76
Basic, Valley furnace	18.00	18.00	18.00	18.00
Malleable, Chicago*	18.50	18.50	18.50	18.50
Malleable, Valley	18.50	18.50	18.50	18.50
L. S. charcoal, Chicago	24.25	24.25	24.25	24.04
Ferromanganese, seab'd carlots	85.00	85.00	85.00	85.00

†This quotation is for delivery in South; in the North prices are 38c. a ton under delivered quotations from nearest Northern furnace.

*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Rails, Billets, etc.

Per Gross Ton:				
Rails, heavy at mill	$36.37½	$36.37½	$36.37½	$36.37½
Light rails, Pittsburgh	35.00	35.00	35.00	35.00
Rerolling billets, Pittsburgh	27.00	27.00	27.00	27.00
Sheet bars, Pittsburgh	28.00	28.00	28.00	28.00
Slabs, Pittsburgh	27.00	27.00	27.00	27.00
Forging billets, Pittsburgh	32.00	32.00	32.00	34.00
Wire rods, Pittsburgh	38.00	38.00	38.00	38.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.70	1.70	1.70	1.70

Finished Steel

Per Lb.:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.80	1.80	1.80	1.80
Bars, Chicago	1.85	1.85	1.85	1.85
Bars, Cleveland	1.85	1.85	1.85	1.85
Bars, New York	2.15	2.15	2.15	2.13
Plates, Pittsburgh	1.80	1.80	1.80	1.80
Plates, Chicago	1.85	1.85	1.85	1.85
Plates, New York	2.09	2.09	2.09	2.13
Structural shapes, Pittsburgh	1.80	1.80	1.80	1.80
Structural shapes, Chicago	1.85	1.85	1.85	1.85
Structural shapes, New York	2.06¼	2.06¼	2.06¼	2.10¼
Cold-finished bars, Pittsburgh	1.95	1.95	1.95	2.10
Hot-rolled strips, Pittsburgh	1.85	1.85	1.85	1.85
Cold-rolled strips, Pittsburgh	2.60	2.60	2.60	2.60

Finished Steel

Per Lb.:	July 9, 1935 Cents	July 2, 1935 Cents	June 11, 1935 Cents	July 10, 1934 Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.40	2.40	2.40	2.45
Hot-rolled annealed sheets, No. 24, Gary	2.50	2.50	2.50	2.55
Sheets, galv., No. 24, P'gh	3.10	3.10	3.10	3.10
Sheets, galv., No. 24, Gary	3.20	3.20	3.20	3.20
Hot-rolled sheets, No. 10, P'gh	1.85	1.85	1.85	1.85
Hot-rolled sheets No. 10, Gary	1.95	1.95	1.95	1.95
Wire nails, Pittsburgh	2.60	2.60	2.60	2.60
Wire nails, Chicago dist. mill	2.65	2.65	2.65	2.65
Plain wire, Pittsburgh	2.30	2.30	2.30	2.30
Plain wire, Chicago, dist. mill	2.35	2.35	2.35	2.35
Barbed wire, galv., P'gh	3.00	3.00	3.00	3.00
Barbed wire, galv., Chicago dist. mill	3.05	3.05	3.05	3.05
Tin plate, 100 lb. box, P'gh	$5.25	$5.25	$5.25	$5.25

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	$11.75	$11.75	$11.75	$11.75
Heavy melting steel, Phila.	10.50	10.50	10.50	10.50
Heavy melting steel, Ch'go	10.00	10.00	9.87½	9.50
Carwheels, Chicago	10.50	10.50	10.50	9.50
Carwheels, Philadelphia	11.25	11.25	11.25	12.50
No. 1 cast, Pittsburgh	13.25	13.25	13.25	12.25
No. 1 cast, Philadelphia	11.25	11.25	11.25	11.75
No. 1 cast, Ch'go (net ton)	9.00	9.00	9.00	7.25
No. 1 RR wrot., Phila.	10.25	10.25	10.25	11.25
No. 1 RR. wrot., Ch'go (net)	8.00	7.75	7.75	7.25

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$3.25	$3.50	$3.50	$3.85
Foundry coke, prompt	4.00	4.00	4.00	4.60

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, refinery	7.75	7.75	8.75	8.75
Lake copper, New York	8.12½	8.12½	9.12½	9.12½
Tin (Straits), New York	52.37½	51.87½	50.50	51.87½
Zinc, East St. Louis	4.30	4.30	4.25	4.35
Zinc, New York	4.67½	4.67½	5.62½	4.70
Lead, St. Louis	4.00	3.85	3.85	3.60
Lead, New York	4.15	4.00	4.00	3.75
Antimony (Asiatic), N. Y.	12.75	12.75	12.75	7.75

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
July 9, 1935	2.124c. a Lb.	$17.84 a Gross Ton	$10.75 a Gross Ton
One week ago	2.124c.	17.84	10.75
One month ago	2.124c.	17.84	10.71
One year ago	2.131c.	17.90	10.58
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products make 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1935	2.124c., Jan. 3	2.124c., Jan. 8	$17.90, Jan. 8	$17.83, May 14	$12.33, Jan. 8	$10.33, April 23
1934	2.199c., April 24	2.008c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	2.015c., Oct. 3	1.867c., April 18	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.977c., Oct. 4	1.926c., Feb. 2	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.273c., Jan. 7	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.317c., April 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22

Operations Make Sharp Recovery in Tri-State Area

Further Gain Loked for in Pittsburgh Next Week—Primary Wire Market Not Disturbed by Unsettlement in Warehouse Prices—Furnace Coke Declines

PITTSBURGH, July 9. — Raw steel production in the Pittsburgh area has recovered most of the ground lost during the holiday week, and in the current period has risen four points to 30 per cent of capacity. In the Valleys and nearby northern Ohio mills operations have jumped six points to 41 per cent. Schedules in the Wheeling district have risen sharply to 55 per cent, a 17-point advance over last week's rate.

Most Pittsburgh producers are starting the week with a small accumulation of orders culled over the holiday, but continued suspension of operations at a small independent mill and unchanged schedules of the leading producer this week are holding down the rate for the district. Increased output is in prospect next week, when moderate stocks of ingots will have been largely depleted.

There is no change in the drift of steel demand, with miscellaneous consumers still leading in the current movement of finished steel. Agricultural machinery and implement makers still are important factors. The automobile industry continues to place fill-in lots for final runs on 1935 models, and a few orders for sheets already have been placed for 1936 models. Expanding demand for steel for next year's models is expected late in July. The placing of orders for subway cars with car builders in the Pittsburgh district has brightened prospects for plate demand. Structural awards are featured by an increasing amount of private work. Seasonal shrinkage in wire demand has been encouragingly moderate, owing to a substantial movement of barbed wire fencing. Base prices for primary wire have not been disturbed by unsettlement in the secondary wire nail markets.

In most instances finishing mills have resumed the production rates in effect prior to the holiday. Sheet mill output this week is expected to average 50 per cent, hot strip 30 to 35 per cent, and tin plate 65 per cent. Bituminous coal and Connellsville furnace coke prices are soft.

Pig Iron

Small orders are more numerous after the holiday week, and the heavier melts planned at many foundries this week are expected to stimulate a steady, though small, flow of spot business. Non-integrated steel mills still are no exceptions to the hand-to-mouth character of buying, and at present offer little or no promise of major covering for some time.

Semi-Finished Steel

This market is following the drift of general steel activity and, while featureless, presents a cheerful tone. Detached mills have generally reduced their takings of semi-finished grades, but demand is expected to be fairly sensitive to the movement of finished steel, which appears to be gaining after the holiday.

Bolts, Nuts and Rivets

Demand is quiet. Prospects for a fair movement of nuts, bolts and rivets have been brightened further by the placing of 500 subway cars, including 150 with Pullman-Standard Car Mfg. Co. and 100 with Pressed Steel Car Co., presumably for construction in the Pittsburgh district. Large producers are endeavoring to maintain current discounts, which still are subject to shading by some smaller sellers.

Rails and Track Accessories

A few small orders for spikes have reached this district for track repair work in some flooded areas in the Middle West. The local rail producer is running occasionally on a small backlog of miscellaneous orders.

Reinforcing Steel

Public works construction planned by the Allegheny County Authority has temporarily been snagged by a proposed Congressional investigation. The amount of state road work that has been let thus far in the current season has been too small to add much to mill order books. It is reported that rail steel will be specified for the Congressional Library addition at Washington. Base prices remain undisturbed.

Cold-Finished Bars

Although current aggregate tonnage is declining, prospects for an early pickup in demand are considered favorable. The bright spot is the expected buying by one or two large motor car makers some time this month for early work on 1936 models. Jobbing business is fair but is not measuring up to demand from farm implement manufacturers, whose contra-seasonal schedules are a source of exceptional benefit to some cold-finished producers. Demand from machine tool manufacturers remains quiet.

Plates and Shapes

The placing of 500 subway cars and 100 street cars by New York transportation companies promises a substantial demand for plates. With part of the order going to car builders in this district the chances are considered good for the placing of a substantial plate tonnage here. The barge market has made no headway since a week ago, and the only imminent purchase is that of the American Oil Co. Boiler construction shows scattered improvement.

Structural awards reported here for the past week were far in excess of new inquiries. Of a total of 6260 tons of awards, 3460 tons was for private projects.

Tubular Products

The pipeline market appears to be more active, but little important tonnage thus far has materialized. The 300-mile natural gas line from Muncie, Ind., to Detroit, planned by the Panhandle Eastern Pipe Line Co., still hinges upon the setting up of financial arrangements, the chances for which are reported to be favorable. In the general pipe market, oil-country goods continues to lead, with standard pipe holding its own. Car lot demand for locomotive boiler tubes has picked up.

Bars

July tonnage has been coming in at a rate comparable with that in the first week in June. The complexion of demand has not changed, with miscellaneous buying leading in importance. Some fillip to the market is expected later in July, if plans of some automobile producers to get into production on

new models materialize. It does not now appear likely that any early interruption is in sight in the movement of bars to farm machinery and tractor makers.

Wire Products

Seasonal recession in demand has been less than usual and is being offset substantially by a heavy movement of barbed wire fencing which, as reported by several producers, is greater this year than it has been in the past three years. Demand for wire nails is quiet. Although secondary wire nail markets lack stability, all base prices for primary wire products are well maintained. Wire mill production in the Pittsburgh district in the current week is estimated at 30 to 35 per cent.

Sheets

Despite the holiday last week, orders have continued in steady volume. Some mills that shut down on Wednesday night for the remainder of last week will have fair backlogs on which to schedule operations in the current period. Sheet output or the industry will rebound this week at least to 50 per cent of capacity, with some units averaging higher. Automobile specifications still are coming in for 1935 assemblies, while a few orders for 1936 models, notably for Buick, Nash and Studebaker, have been placed.

Tin Plate

With packing of early crops well under way, specifications from canning companies are being received in substantial volume, and stocks of tin plate at mill warehouses have been measurably reduced. While June represented a peak month for shipments in some instances, movement in July in other cases is expected to reach the apex for the year. Practically all producers will operate this week on schedules that prevailed prior to the holiday week. Output for the industry in the current period is estimated at 65 per cent.

Coke and Coal

Prices in the bituminous coal market still are demoralized by the flood of offerings that had accumulated prior to the threatened strike. With the turnover of fuel drastically limited, prices for the time being are nominally unchanged, with the exception of steam slack which is 10c. to 15c. a ton lower. Connellsville furnace coke for prompt shipments also has softened further and is 10c. a ton lower at $3.25, ovens. Foundry coke still appears to be firm and unchanged.

Strip Steel

Most strip schedules in the current week are markedly higher, and some mills will run as high as 40 per cent. Hot strip production, however, probably will average around 30 to 35 per cent. New specifications in July are in fair volume, but the reduced movement to the automotive industry is being felt rather keenly. Not much additional support from that source can now be expected until later in July, when first orders for new model assemblies are expected. Ford and Plymouth at this point appear to be the most likely to place orders early, while Chevrolet probably will lag.

Scrap

A small independent mill in this district has been buying moderate lots of No. 1 heavy melting steel at $11.75 to $12, delivered, the latter figure representing the price paid for the last lot. Although trading is still restricted, quotations remain fairly firm and unchanged, and dealers are not inclined to attract buying by reducing prices. Suspensions at one mill have been lifted and releases are expected around July 15 from another mill, which has held up shipments for several weeks. The closing of several important railroad lists this week probably will provide a fair indication of price trends. The Pennsylvania list, which closes tomorrow, contains about 21,000 tons, including 8700 tons of No. 1 heavy melting steel.

Reaction in Boston Scrap Market

BOSTON, July 9.—After advancing as high as $7.75 a ton, delivered on dock, the market for No. 2 steel has reacted to $7.25 to $7.50 a ton. The market for No. 1 steel rose to $8.75 a ton, delivered, and now is $8.25 to $8.50, mostly $8.50. Aside from this flurry, there has been no disturbance in scrap prices. A steamer with 4100 tons of No. 1 and No. 2 steel destined for Italy, left here July 6 for Savannah to finish loading scrap. A steamer with 5700 tons, also for Italy, will leave here today. A boat scheduled to load a part cargo here for Roumania yesterday was shifted to Providence, R. I., to load 1200 tons, and will finish loading at a Southern port. A boat loading at New York is scheduled to arrive in Providence, July 12, to take 700 tons additional. A steamer here is loading 4500 tons of scrap for Japan. The reported purchase of 40,000 to 50,000 tons of scrap by Youngstown interests has revived hopes of brokers shipping to Pennsylvania.

Evidently New England foundries, at the current rate of operations, have sufficient pig iron for immediate requirements, for little new business has been reported by furnace representatives. Sentiment among consumers regarding the third and fourth quarter outlook is hopeful, however, the general belief being the New England melt by the last quarter will have been stepped up materially.

Demand Fairly Steady In Southern Ohio

CINCINNATI, July 9.—Third quarter ordering of pig iron has receded to more modest levels. Bookings, the past week, totaled about 2000 tons, of which about 800 tons was for spot shipment. Movement of iron on orders is good. June figures stand at a higher level than May's, while the steady melt augurs well for the current period. In fact, furnace interests indicate some surprise at the better than anticipated demand for this season. Prices on both Northern and Southern irons are unchanged.

Scrap is inactive. Virtual suspension of trading interest over the holiday period is reported. Material for contract is adequate. Dealers show no inclination to swell yard supplies despite efforts to increase bids in the hope of strengthening the market undertone for fall purchasing.

Steel jobbers report a steady demand from industrial sources, June business being on a parity with that of May. Except for a slight change in boiler tube prices, quotations are steady.

The sheet steel market is without noticeable change. Demand from general users is being well sustained, while jobbing requirements are better than the seasonal average. Operations, at about 40 to 50 per cent, are justified by current business.

Scrap Prices Holding At Detroit

DETROIT, July 9.—The local scrap market is quiet but prices are being firmly maintained. The Detroit district mill continues disinterested in making fresh purchases, having comfortable stocks on hand. A steady flow of scrap is moving out of Detroit by water to lower Lake ports.

Output Rises to 42 Per Cent in Chicago District

Contraseasonal Demand for Roofing Sheets and Wire Products Is a Factor —Bids To Be Rushed on Mississippi Improvements

CHICAGO, July 9.—New business and specifications for finished steel have now shown improvement for two successive weeks and mills are being forced to reach into higher operating brackets in order to meet the situation. Ingot output has risen four and one-half points to 42 per cent of capacity, where it is firmly entrenched for the time being.

There is still a good flow of business from automobile plants and there is hope among steel men that work on new models will come early enough to avoid a sharp and prolonged curtailment in demand from that direction. Nash is already out with two new models, and its shops are reported to be busy.

Work on the Mississippi River has been exempted from the arbitrary rules as to expenditures for labor and there will be a succession of bid openings, at the rate of about one a week, from now until early fall. These projects will take large tonnages of structural shapes, plates, steel piling and reinforcing bars and will also give work to forgers and foundries.

Roofers are taking sheets in advance of their usual fall buying period, which reflects a situation also found by wire producers who report that farmers are remaining in the market this summer contrary to their practice even in so-called normal years.

There is a stronger undertone to the scrap market and prices offered by dealers for No. 1 scrap clearly show not only that many accumulations are being held as a speculative move but also that quality scrap is none too plentiful, at least within easy reach of Chicago.

Pig Iron

So far in July shipments of Northern iron have been running about 10 per cent below the June average, but in recent days shipping instructions have been more numerous and there is reason to believe that this 10 per cent margin will be reduced before the end of the month. There is more interest in third quarter buying and attractive tonnages are being added to producers' books. Foundrymen report fairly steady business and in some cases heavier orders have been booked. All prices remain firm.

Reinforcing Bars

The holiday has cut deeply into this market's activity. The Indianapolis, Ind., housing project and local Sanitary District, Contract No. 1, the two large projects actively before the trade, have been delayed a few days as a direct result of the holiday. Tonnages which will bring real life to the trade are the Mississippi River locks and grade separation projects. Plans on all of these jobs are well advanced, but Government money will not be made available until a satisfactory arrangement has been made as to the relationship between expenditures for labor and materials. Chicago housing projects are at a standstill.

Cast Iron Pipe

The holiday could do little harm to this market for the reason that it was already very quiet. New plans for pipe laying are scarce, and as a matter of fact preliminary studies are not numerous. Municipalities are complaining about construction costs, which they insist are too high, notwithstanding aid in the form of free Federal grants and low rates of interest on that part of the money which must be borrowed. This is not a complaint against cast iron pipe prices alone, but it is against all factors of costs, including labor. The contractor at Waukegan, Ill., may soon sublet about 300 tons of pipe.

Bars

Sales match those of the previous week, when a sharp gain was registered. One of the surprising things is that releases from automobile plants are still in good volume, though it is expected by the trade that they will drop sharply in the near future. Tractor and farm implement plants remain busy, and so far as can now be determined road machinery schedules have not been materially hurt by the wrangle over distribution of labor and materials on future Government expenditures. Bar orders are numerous and well diversified, usually calling for quick delivery. Bolt and nut manufacturers have lowered operating schedules.

Wire Products

Output remains at 40 to 45 per cent of capacity, and mill stocks are not growing. In the first place, the seasonal drop is surprisingly small, and also farmers, who usually stay out of the market through most of the summer, are still taking wire mill products. The crop situation remains excellent, with most small grains assured at this time. Corn is late in many sections, but even that crop is expected to be of large proportions. Small manufacturers are erratic in stating needs but their aggregate requirements are gratifying.

Rails

The Nickel Plate is in the market for 4000 tons of rails. Other than this the market is quiet, though sellers are expecting inquiries from several Western railroads. Accessory orders, mostly for tie plates and spikes, total 3000 tons. Light rail business is limited to infrequent carlot orders.

Sheets

Output of hot mills remains at 70 to 75 per cent of capacity. Sheet movement to automobile plants is still in good volume, and roofing manufacturers are taking moderate tonnages in advance of the time that they usually start to produce for the fall market. Most orders are for prompt delivery and no speculative buying is apparent.

Plates

Small tonnages for tanks and a gas holder constitute all of the new business that has appeared in the plate market. However, there remain before the trade the plates needed for the Chesapeake & Ohio cars and numerous locks and dams on the Mississippi River, bidding on which will start on July 16.

Structural Material

The rush of bidders is on in connection with Mississippi River dams and locks, which will go ahead, according to late announcements, without regard to rulings as to the balance between labor and materials. Bids will be taken on dams on Aug. 8, 14, 20 and 27 and on locks on July 16, 23, 29 and

Aug. 3. All other Government work is dragging, which is unfortunate for the reason that private undertakings are scant and shops are in need of everything that can be turned in their direction.

Scrap

A stronger undertone is noted in the scrap market, though as yet consumer buying remains light. The whole situation appears to be tied in closely with the matter of supplies that are immediately available, and the fact that there is much off-grade scrap being offered and when a buyer is particular he finds that quite often he has to reach out for desired specifications. Dealers are inclined to hold yard scrap and they report that they are getting little new scrap. On the other hand, railroad lists that are about to be offered will be heavy, and it is indicated that railroads will get good prices for the tonnages.

Pipe Lines

Consumers Power Co., Jackson, Mich., has approved plans for new welded steel pipe line from Millbrook district, Mecosta County, to connection with main pipe line in Broomfield Township gas fields, Isabella County, about 30 miles, for natural gas supply from first noted section, for service at Bay City, Saginaw and Midland. Cost close to $200,000.

Centerville, Miss., plans steel pipe lines for natural gas supply, including distribution system. Fund of $36,000 has been arranged through Federal aid.

Westgate Oil Co., Tradesmen's Building, Oklahoma City, Okla., plans 10-in. crude oil welded steel pipe line from Carey lease in oil field district near city to bulk terminal, about 2½ miles. Cost about $35,000. E. D. Hill, insurance Building, Oklahoma City, is consulting engineer.

San Diego, Cal., plans steel pipe line for completion of El Capitan water supply system. Fund of $560,000 has been arranged for this and road construction in connection with project, of which $219,000 has been secured through Federal aid.

Skiatook, Okla., has awarded contract to B. & M. Construction Co., Petroleum Building, Oklahoma City, for 8-in. steel pipe line from Mohawk pumping station, Tulsa, Okla., to municipality, about 12 miles, for main water supply by gravity flow system, at $94,888, including cast iron pipe lines for local distribution. Victor H. Cochrane, Wright Building, Tulsa, is consulting engineer.

North Central Gas Co., Casper, Wyo., J. M. McIntyre, president, has let contract to Williams Brothers, Tulsa, Okla., for welded steel pipe line from Clayton, near Casper, to Bridgeport, Neb., and vicinity, for natural gas supply in latter district. Cost about $1,000,000.

Milton, Fla., is considering steel pipe lines for municipal gas distribution. Cost about $50,000. Financing will be arranged through Federal aid.

Metropolitan Water District, Los Angeles, will open bids Aug. 3 for 810 tons of steel pipe for Cajalco dam, dike and tunnels near Riverside, Cal.

Trade Agreement with Sweden Proclaimed; Steel Duties Reduced

WASHINGTON, July 9.—To become effective Aug. 5, President Roosevelt yesterday proclaimed the trade agreements between the United States and Sweden, signed May 25. The agreement calls for reduction in a number of duties on high-grade iron and steel products.

At the same time the President in a letter directed the Secretary of the Treasury with regard to the application of the proclaimed duties to products of third countries. The letter set forth three groups of countries, the first including those to which the reduced duties on American products will apply until Oct. 1, 1935, the second a group to which the duties will apply for only 30 days and the third a group to which the duties will apply so long as they are in effect. The reason of the shortened term for application of the duties to the first and second group is alleged discrimination practised by the affected countries against the United States. The first group consists of France, including Algeria and its assimilated colonies; the Netherlands, Spain, Switzerland and Lichtenstein. The second group consists of Denmark, Germany, Italy, Portugal and its colonies and possessions.

The reduced duties on the principal iron and steel products included in the agreement follow:

Product	New Rate of Duty
Granular or sponge iron	$1.25 per ton
Ferrochrome or ferrochromium containing 3 per cent or more of carbon	1.25c. per lb. on the chromium contained therein.
Ferrochrome or ferrochromium containing less than 3 per cent of carbon, and chrome metal or chromium metal	25 per cent ad val.
Muck bars, pieces thereof except crop ends, bar iron, and round iron in coils or rods, iron in slabs, blooms, loops, or other forms less finished than iron in bars and more advanced than pig iron, except castings; all the foregoing	
Valued above 2½c. and not amove 3½c. a lb.	0.5c. a lb.
Valued above 3½c. and not above 5c. a lb.	0.8c. a lb.
Valued above 5c. a lb.	1.0c. a lb.
Steel ingots, cogged ingots, blooms and slabs, by whatever process made; die blocks or blanks; billets and bars, whether solid or hollow; shafting; pressed, sheared, or stamped shapes, not advanced in value or condition by any process or operation subsequent to the process of stamping; hammer molds or swaged steel; gun-barrel molds not in bars; concrete reinforcement bars; all descriptions and shapes of dry sand, loam, or iron molded steel castings; sheets and plates and steel not specially provided for; all the foregoing valued above 2½c. and not above 8c. a lb.	20 per cent ad val.
The additional duty to be levied, collected, and paid under paragraph 305 (1) on any steel or iron in the materials and articles enumerated or described in paragraphs 303, 304, 307, 308, 312, 313, 315, 316, 317, 318, 319, 322, 323, 324, 327, and 328 and valued at more than 3½c. but not more than 8c. a lb. shall be...	4 per cent ad val.
Wire rod: Rivet screw, fence, and other iron or steel wire rods, whether round, oval, or square, or in any other shape, nail rods and flat rods up to six inches in width ready to be drawn or rolled into wire or strips, all the foregoing in coils or otherwise:	
Valued over 2½c. and not over 4c. a lb.	0.3c. a lb.
Valued over 4c. a lb.	0.6c. a lb.
Round iron or steel wire, valued above 6c. a lb.	20 per cent ad val.
All flat wires and all steel in strips not exceeding 16 inches in width, whether in long or short lengths, in coils or otherwise, and whether rolled or drawn through dies or rolls, or otherwise produced:	
Not thicker than 0.01 in.	15 per cent ad val.
Thicker than 0.01 in. and not thicker than 0.05 in.	20 per cent ad val.
Antifriction balls and rollers, metal balls and rollers commonly used in ball or roller bearings, metal ball or roller bearings, and parts thereof, whether finished or unfinished, for whatever use intended	8c. a lb. and 35 per cent ad val.

Prices of Finished Steel and Iron Products

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel — *Base per Lb.*

F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Gary	1.85c.
F.o.b. Duluth	1.95c.
Del'd Detroit	1.95c.
F.o.b. Cleveland	1.85c.
F.o.b. Buffalo	1.90c.
Del'd Philadelphia	2.11c.
Del'd New York	2.15c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.

Rail Steel

(For merchant trade)

F.o.b. Pittsburgh	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Gary	1.75c.
F.o.b. Moline, Ill.	1.75c.
F.o.b. Cleveland	1.75c.
F.o.b. Buffalo	1.80c.
F.o.b. Birmingham	1.85c.
F.o.b. cars dock Gulf ports	2.10c.
F.o.b. cars dock Pacific ports	2.25c.

Billet Steel Reinforcing

(Straight lengths as quoted by distributors)

F.o.b. Pittsburgh	2.05c.
F.o.b. Chicago	2.10c.
F.o.b. Gary	2.10c.
Del'd Detroit	2.20c.
F.o.b. Cleveland	2.10c.
F.o.b. Youngstown	2.10c.
F.o.b. Buffalo	2.10c.
F.o.b. Birmingham	2.10c.
F.o.b. cars dock Gulf ports	2.45c.
F.o.b. cars dock Pacific ports	2.45c.

Rail Steel Reinforcing

(Straight lengths as quoted by distributors)

F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago	1.95c.
F.o.b. Gary	1.95c.
F.o.b. Cleveland	1.95c.
F.o.b. Youngstown	1.95c.
F.o.b. Buffalo	1.95c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.30c.
F.o.b. cars dock Pacific ports	2.30c.

Iron

F.o.b. Chicago	1.80c.
F.o.b. Terre Haute, Ind.	1.75c.
F.o.b. Louisville, Ky.	2.10c.
F.o.b. Danville, Pa.	1.80c.
F.o.b. Berwick, Pa.	1.70c.

Cold Finished Bars and Shafting*

Base per Lb.

F.o.b. Pittsburgh	1.95c.
F.o.b. Chicago	2.00c.
F.o.b. Gary	2.00c.
F.o.b. Cleveland	2.00c.
F.o.b. Buffalo	2.05c.
Del'd Detroit	2.15c.
Del'd eastern Michigan	2.20c.

* In quantities of 10,000 to 19,000 lb.

Fence and Sign Posts

Angle Line Posts

Base per Net Ton

F.o.b. Pittsburgh	$50.00
F.o.b. Chicago	50.00
F.o.b. Duluth	51.00
F.o.b. Cleveland	50.00
F.o.b. Birmingham	53.00
F.o.b. Houston, Orange, Beaumont, Galveston	59.00
F.o.b. Mobile	58.00
F.o.b. New Orleans, Lake Charles, Corpus Christi	59.00
F.o.b. cars dock Pacific ports	63.00

Plates

Base per Lb.

F.o.b. Pittsburgh	1.86c.
F.o.b. Chicago	1.85c.
F.o.b. Gary	1.85c.
Del'd Cleveland	1.995c.
F.o.b. Coatesville	1.90c.
F.o.b. Sparrows Point	1.90c.
Del'd Philadelphia	1.99c.
Del'd New York	2.09c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.
Wrought iron plates, f.o.b. P'gh	3.20c.

Floor Plates

F.o.b. Pittsburgh	2.35c.
F.o.b. Chicago	2.40c.
F.o.b. Coatesville	2.45c.
F.o.b. cars dock Gulf ports	2.75c.
F.o.b. cars dock Pacific ports	3.90c.

Structural Shapes

Base per Lb.

F.o.b. Pittsburgh	1.86c.
F.o.b. Chicago	1.85c.
Del'd Cleveland	1.995c.
F.o.b. Buffalo	1.90c.
F.o.b. Bethlehem	1.90c.
Del'd Philadelphia	2.015c.
Del'd New York	2.0625c.
F.o.b. Birmingham (standard)	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.

Steel Sheet Piling

Base per Lb.

F.o.b. Pittsburgh	2.15c.
F.o.b. Chicago	2.25c.
F.o.b. Buffalo	2.25c.
F.o.b. cars dock Gulf ports	2.60c.
F.o.b. cars dock Pacific ports	2.60c.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot Rolled

Base per Lb.

No. 10, f.o.b. Pittsburgh	1.85c.
No. 10, f.o.b. Gary	1.95c.
No. 10, del'd Detroit	2.05c.
No. 10, del'd Phila.	2.16c.
No. 10, f.o.b. Birmingham	2.00c.
No. 10, f.o.b. dock cars Pacific ports	2.40c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.40c.
No. 24, f.o.b. Gary	2.50c.
No. 24, del'd Detroit	2.60c.
No. 24, del'd Phila.	2.71c.
No. 24, f.o.b. Birmingham	2.55c.
No. 24, f.o.b. dock cars Pacific ports	3.05c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.50c.
No. 10 gage, f.o.b. Gary	2.60c.
No. 10 gage, del'd Detroit	2.70c.
No. 10 gage, del'd Phila.	2.81c.
No. 10 gage, f.o.b. Birmingham	2.65c.
No. 10 gage, f.o.b. dock cars Pacific ports	3.10c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	2.95c.
No. 20 gage, f.o.b. Gary	3.05c.
No. 20 gage, del'd Detroit	3.15c.
No. 20 gage, del'd Phila.	3.26c.
No. 20 gage, f.o.b. Birmingham	3.10c.
No. 20, f.o.b. dock cars Pacific ports	3.50c.

Galvanized Sheets

No. 24 gage, f.o.b. Pittsburgh	3.10c.
No. 24, f.o.b. Gary	3.20c.
No. 24, del'd Phila.	3.41c.
No. 24, f.o.b. Birmingham	3.25c.
No. 24, f.o.b. dock cars Pacific ports	3.70c.
No. 24, wrought iron, Pittsburgh	4.95c.

Long Ternes

No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh	3.40c.
F.o.b. Gary	3.50c.
F.o.b. cars dock Pacific ports	4.10c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	3.10c.
No. 20, f.o.b. Gary	3.20c.
No. 20, f.o.b. Birmingham	3.70c.
No. 20, f.o.b. cars dock Pacific ports	3.70c.
No. 10, f.o.b. Pittsburgh	2.50c.
No. 10, f.o.b. Gary	2.60c.
No. 10, f.o.b. Birmingham	3.10c.
No. 10, f.o.b. cars dock Pacific ports	3.10c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.75c.
No. 28, Gary	2.85c.
No. 28, cars dock Pacific Coast ports	3.35c.

Tin Plate

Per Base Box

Standard cokes, f.o.b. P'gh district mill	$5.25
Standard cokes, f.o.b. Gary	5.35
Standard cokes, f.o.b. cars dock Pacific ports	5.90

Terne Plate

(F.o.b. Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$10.00
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.00
30-lb. coating I.C.	15.25
40-lb. coating I.C.	17.50

Hot-Rolled Hoops, Bands, Strips and Flats under ¼ In.

Base per Lb.

All widths up to 24 in., P'gh	1.85c.
All widths up to 24 in., Chicago	1.95c.
All widths up to 24 in., del'd Detroit	2.05c.
All widths up to 24 in., Birmingham	2.00c.
Cooperage stock, Pittsburgh	2.10c.
Cooperage stock, Chicago	2.20c.

Cold-Rolled Strips

Base per Lb.

F.o.b. Pittsburgh	2.60c.
F.o.b. Cleveland	2.60c.
Del'd Chicago	2.995c.
F.o.b. Worcester	2.80c.

Fender Stock

No. 14, Pittsburgh or Cleveland	2.90c.
No. 14, Worcester	3.30c.
No. 20, Pittsburgh or Cleveland	3.30c.
No. 20, Worcester	3.70c.

Hot-Rolled Rail Steel Strips

Base per Lb.

F.o.b. Pittsburgh	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Birmingham	1.85c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Manufacturing Trade — *Per Lb.*

Bright wire	2.30c.
Spring wire	2.90c.

Chicago prices on products sold to the manufacturing trade are $1 a ton above Pittsburgh or Cleveland. Worcester and Duluth prices are $2 a ton above, Birmingham $3 above, and Pacific Coast prices $9 a ton above Pittsburgh or Cleveland.

To Jobbing Trade

Qualified jobbers are entitled to a reduction of 20c. a 100 lb. from the base price on carload shipments to stock, and of 10c. a 100 lb. on less-carload shipments to stock.

Base per Keg

Standard wire nails	$2.60
Smooth coated nails	2.60
Galvanized nails:	
15 gage and coarser	4.60
16 gage and finer	5.10

Base per 100 Lb.

Annealed fence wire	$2.45
Galvanized fence wire	2.80
Polished staples	3.30
Galvanized staples	3.55
Barbed wire, galvanized	3.00
Woven wire fence, base column	63.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill prices are $2 a ton over Pittsburgh (except for woven wire fence at Duluth which is $3 over Pittsburgh), and Birmingham mill prices are $3 a ton over Pittsburgh.

On wire nails, barbed wire, staples and fence wire, prices at Houston, Galveston and Corpus Christi, Tex., New Orleans, Lake Charles, La., and Mobile, Ala., are $6 a ton over Pittsburgh, while Pacific Coast prices are $8 over Pittsburgh. Exception: on fence wire Pacific Coast prices are $11 a ton above Pittsburgh.

On staples and barbed wire, prices of $6 a ton above Pittsburgh are also quoted at Beaumont and Orange, Tex.

Wire Hoops, Twisted or Welded

Off List

F.o.b. Pittsburgh	35 and 2½ off
F.o.b. Chicago	35 off

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel			Wrought Iron		
Inches	Black	Galv.	Inches	Black	Galv.
⅛	51½	29½	⅛	+91½	+133
¼ to ⅜	53½	35	¼ & ⅜	+1½	+21½
½	58½	47	½	31½	15
¾	62	53	¾	36½	20½
1 to 3	64	55	1 & 1¼	39½	25½
			1½	43½	28
			2	41½	26

Lap Weld

2	60	51	2	27	23½
2½ to 3	62	54	2½ to 3½	33	25
3½ to 6	65	56	4 to 8	40	28½
7 and 8	64	54	9 to 12	38	24½
9 and 10	63½	53½			
11 and 12	62½	53½			

Butt Weld, extra strong, plain ends

⅛	48½	33½	⅛	+13	+45½
¼ to ⅜	51	38	¼ & ⅜	+2½	+34½
½	56½	47½	½	32½	17½
¾	61	52	¾	37½	23½
1 to 3	63	55	1 to 2	43½	29

Lap Weld, extra strong, plain ends

2	58	50	2	40	26
2½ to 3	62	54	2½ to 4	45½	33
3½ to 6	65½	57½	4½ to 6	45	23½
7 and 8	64½	54½	7 & 8	46	33
9 and 10	63½	53½	9 to 12	41½	30
11 and 12	62½	53½			

On standard steel pipe an extra 5% off is allowed on sales to consumers while two 5's off apply on sales to jobbers. On less-than-carload shipments prices are determined by adding 20 and 25% and the carload freight rate to the base card. On structural steel pipe the base card is reduced 2 points and two 5's off are allowed to consumers and three 5's off to jobbers.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Seamless Steel Commercial Boiler Tubes and Locomotive Tubes

(Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots)

		Cold Drawn	Hot Rolled
1 in. o.d.	13 B.W.G.	$ 8.60	$7.82
1¼ in. o.d.	13 B.W.G.	10.19	9.26
1½ in. o.d.	13 B.W.G.	11.36	10.32
1¾ in. o.d.	13 B.W.G.	12.81	11.64
2 in. o.d.	12 B.W.G.	14.35	13.04
2¼ in. o.d.	12 B.W.G.	16.00	14.54
2½ in. o.d.	12 B.W.G.	17.61	16.01
2¾ in. o.d.	12 B.W.G.	19.29	17.54
3 in. o.d.	12 B.W.G.	20.45	18.59
3 in. o.d.	12 B.W.G.	21.45	19.50
4½ in. o.d.	10 B.W.G.	41.08	37.35
3½ in. o.d.	11 B.W.G.	27.09	24.63
4 in. o.d.	10 B.W.G.	33.60	30.54
4½ in. o.d.	10 B.W.G.	41.08	37.35
5 in. o.d.	9 B.W.G.	51.56	46.87
6 in. o.d.	7 B.W.G.	79.15	71.96

Extras for less-carload quantities:

25,000 lb. or ft. to 39,999 lb. or ft.	5 %
12,000 lb. or ft. to 24,999 lb. or ft.	12½ %
6,000 lb. or ft. to 11,999 lb. or ft.	25 %
2,000 lb. or ft. to 5,999 lb. or ft.	35 %
Under 2,000 lb. or ft.	50 %

Lapweld Steel and Knobbled Charcoal Iron Pressure Tubes

(Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots)

		Steel	Iron
1½ in o.d.	13 B.W.G.	$ 9.72	$20.16
1¾ in. o.d.	13 B.K.G.	11.06	21.84
2 in. o.d.	13 B.W.G.	12.38	17.23
2½ in. o.d.	13 B.W.G.	13.79	19.58
2½ in. o.d.	12 B.W.G.	16.58	24.19
2¾ in. o.d.	12 B.W.G.	17.54	26.46
3 in. o.d.	12 B.W.G.	18.35	28.29
3½ in. o.d.	11 B.W.G.	21.56	33.95
3½ in. o.d.	11 B.W.G.	23.15	36.16
4 in. o.d.	10 B.W.G.	28.66	45.36
4½ in. o.d.	10 B.W.G.	35.22	50.48
5 in. o.d.	9 B.W.G.	44.25	61.86
6 in o.d.	7 B.W.G.	68.14	102.46

Quantity Extras:

40,000 lb or ft.	base
25,000 lb. or ft. to 39,999 lb. or ft.	plus 5%
10,000 lb. or ft. to 24,999 lb. or ft.	plus 12½ %
2,000 lb. or ft. to 9,999 lb. or ft.	plus 25%
Under 2,000 lb. or ft.	plus 40%

CAST IRON WATER PIPE

Per Net Ton

*6-in. and larger, del'd Chicago	$48.40
*4-in., del'd Chicago	51.40
6-in. and larger, del'd New York	45.20
4-in. del'd New York	48.20
*6-in. and larger, Birmingham	40.00
*4-in. Birmingham	43.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles	48.00
F.o.b. dock, Seattle	49.50

Class "A" and gas pipe, $3 extra.

*Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $39, Birmingham, and $47.40, delivered Chicago, and 4-in. pipe, $42. Birmingham, and $50.40 a ton, delivered Chicago.

RAILROAD MATERIALS

Rails and Track Supplies

F.o.b. Mill

Standard rails, heavier than 60 lb. per gross ton	$36.37½
Angle bars, per 100 lb.	2.55

F.o.b. Code Basing Points

Light rails (from billets) per gross ton	$35.00
Light rails (from rail steel) per gross ton	34.00

Base per 100 Lbs.

Spikes, 9/16 in. and larger	$2.40
Spikes, ½ in .and smaller	2.40
Tie plates, steel	1.90
Tie plates, Pacific Coast ports	2.00
Track bolts, to steam railroads	3.35
Track bolts, to jobbers, all sizes (per 100 count)	70 per cent off list

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Buffalo, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa.; on spikes alone, Cleveland, Youngstown, Lebanon, Pa., Columbia, Pa., Richmond, Va.

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine bolts	70, 10 and 5
Carriage bolts	70, 10 and 5
Lag bolts	70, 10 and 5
Plow bolts, Nos. 1, 2, 3 and 7 heads	70, 10 and 5
Hot-pressed nuts, blank or tapped, square	70, 10 and 5
Hot-pressed nuts, blank or tapped, hexagons	70, 10 and 5
C.p.c. and t. square or hex. nuts, blank or tapped	70, 10 and 5
Semi-finished hexagon nuts, U.S.S.S. and S.A.E., all sizes to and incl. 1 in. diameter	70, 10 and 5
Larger than 1 in. diameter	70
Stove bolts in packages, Pittsburgh	75
Stove bolts in packages, Chicago	75
Stove bolts in packages, Cleveland	75
Stove bolts in bulk, Pittsburgh	83
Stove bolts in bulk, Chicago	83
Stove bolts in bulk, Cleveland	83
Tire bolts	60 and 5

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$2.90
F.o.b. Chicago	3.00
F.o.b. Birmingham	3.05

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70 and 5
F.o.b. Cleveland	70 and 5
F.o.b. Chicago and Birm'g'm	70 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws, 1 in. dia. and smaller	35 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller	75 and 10
Milled headless set screws, cut thread ¾ in. and smaller	75
Upset hex. head cap screws, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller	87½
Upset set screw, cut and oval point	80
Milled studs	65 to 65 and 10

Alloy and Stainless Steel

Alloy Steel Ingots

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Uncropped ..... $0 per gross ton

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Base price, $40 a gross ton.

Alloy Steel Bars

Price del'd Detroit is $52.
F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.
Open-hearth grade, base ..... 2.45c.
Delivered price at Detroit is ..... 2.60c.

S.A.E. Series Numbers	Alloy Differential per 100 lb.
2000 (1½ Nickel)	$0.25
2100 (2½% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum) (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	base
6100 Chromium Vanadium Bar	1.20
6100 Chromium Vanadium Spring Steel	0.70
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. The differential for cold-drawn bars ½c. per lb. higher with separate extras. Blooms, billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base. Sections 4x4 in. to 10x10 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicogo, Gary, Cleveland or Buffalo. 2.95c. base per lb.

STAINLESS STEEL No. 302

(17 to 19% Cr. 7 to 9% NI. 0.08 to 0.20% C.)

(Base Prices f.o.b. Pittsburgh)

	Per Lb.
Forging billets	19.55c.
Rerolling slabs	15c.
Bars	23c.
Plates	26c.
Structural shapes	23c.
Sheets	33c.
Hot-rolled strip	20¾c.
Cold-rolled strip	27c.
Drawn wire	23c.

Raw and Semi-Finished Steel

Carbon Steel Rerolling Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham.
Uncropped ..... $29 per gross ton

Carbon Steel Forging Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Birmingham.
Uncropped ..... $31 per gross ton

Billets, Blooms and Slabs

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham.

	Per Gross Ton
Rerolling	$27.00
Forging quality	32.00

Delivered Detroit

Rerolling	$30.00
Forging	35.00

Billets Only F.o.b. Duluth

Rerolling	$29.00
Forging	34.00

Sheet Bars

F.o.b. Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open-hearth or Bessemer	$28.00

Skelp

F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved	1.70c.
Universal	1.70c.
Sheared	1.70c.

Tube Rounds

	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Cleveland	1.85c.
F.o.b. Buffalo	1.90c.
F.o.b. Birmingham	1.95c.

Wire Rods

(Common, base)

	Per Gross Ton
F.o.b. Pittsburgh	$38.00
F.o.b. Cleveland	38.00
Fo.b. Chicago	39.00
F.o.b. Anderson, Ind.	39.00
F.o.b. Youngstown	39.00
F.o.b. Worcester, Mass.	40.00
F.o.b. Birmingham	41.00
F.o.b. San Francisco	47.00
F.o.b. Galveston	44.00

Pig Iron and Ferroalloys

PIG IRON

PRICES PER GROSS TON AT BASING POINTS

Basing Points	No. 2 Fdry.	Malleable	Basic	Bessemer
Everett, Mass.	$19.50	$20.00	$19.00	$20.50
Bethlehem, Pa.	19.50	20.00	19.00	20.50
Birdsboro, Pa.	19.50	20.00	19.00	20.50
Swedeland, Pa.	19.50	20.00	19.00	20.50
Steelton, Pa.	....	....	19.00	....
Sparrows Point, Md.	19.50	....	19.00	....
Neville Island, Pa.	18.50	18.50	18.00	19.00
Sharpsville, Pa.	18.50	18.50	18.00	19.00
Youngstown	18.50	18.50	18.00	19.00
Buffalo	18.50	19.00	17.50	19.50
Erie, Pa.	18.50	19.00	18.00	19.50
Cleveland	18.50	18.50	18.00	19.00
Toledo, Ohio	18.50	18.50	18.00	19.00
Jackson, Ohio	20.25	20.25	19.75	20.75
Detroit	18.50	18.50	18.00	19.00
Hamilton, Ohio	18.50	18.50	18.00	19.00
Chicago	18.50	18.50	18.00	19.00
Granite City, Ill.	18.50	18.50	18.00	....
Duluth, Minn.	19.00	19.00	....	19.50
Birmingham	14.50	14.50	13.50	19.00
Provo, Utah	17.50	....	17.00	....

DELIVERED PRICES PER GROSS TON AT CONSUMING CENTERS

	No. 2 Fdry.	Malleable	Basic	Bessemer
Boston Switching District From Everett, Mass.	$20.00	$20.50	$19.50	$21.00
Brooklyn From East. Pa.	21.9289	22.4289	21.9289	22.9289
Newark or Jersey City, N. J. From East. Pa.	20.9873	21.4873	20.4873	21.9873
Philadelphia From Eastern Pa.	20.3132	20.8132	19.8132	21.3132
Cincinnati From Hamilton, Ohio	19.5807	19.5807	19.0807	20.0807
Canton, Ohio From Cleveland and Youngstown	19.8402	19.8402	19.3402	20.3402
Columbus, Ohio From Hamilton, Ohio	20.64	20.64	....	....
Mansfield, Ohio From Cleveland and Toledo	20.3832	20.3832	....	....
Indianapolis From Hamilton, Ohio	20.9289	20.9289	....	....
South Bend, Ind. From Chicago	20.6935	20.6935	....	....
Milwaukee From Chicago	19.57	19.57	....	....
St. Paul From Duluth	20.94	....	....	....
Davenport, Iowa From Chicago	20.3832	20.3832	....	....
Kansas City From Granite City	21.2178	21.2178	....	....
San Francisco, Los Angeles or Seattle. From Provo	22.315	....	....	....

Delivered prices on Southern iron for shipment to Northern points are 38c. a gross ton below delivered prices from the nearest Northern basing points.

LOW PHOSPHORUS PIG IRON

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y. $23.50

GRAY FORGE PIG IRON

Valley furnace	$18.00
Pittsburgh district furnace	18.00

CHARCOAL PIG IRON

Lake Superior furnace	$21.00
Delivered Chicago	24.2528
Delivered Buffalo	24.57

CANADA

Pig Iron

Per gross ton:

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$21.00
No. 2 fdy., sil. 1.75 to 2.75	20.50
Malleable	21.00

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$22.50
No. 2 fdy., sil. 1.75 to 2.25	22.00
Malleable	22.50
Basic	22.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

	Per Gross Ton
Domestic, 80% (carload)	$85.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$26.00
50-ton lots 3-mo. shipment	24.00
F.o.b. New Orleans	26.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	$77.50
50% (ton lots)	85.00
75% (carloads)	126.00
75% (ton lots)	136.00

Silvery Iron

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
6%	$22.75	12%	$29.25
7%	23.75	13%	30.75
8%	24.75	14%	32.25
9%	25.75	15%	33.75
10%	26.75	16%	35.25
11%	27.75	17%	36.75

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.
Manganese 2 to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional.

Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
10%	$27.75	14%	$33.25
11%	28.75	15%	34.75
12%	30.25	16%	36.25
13%	31.75	17%	37.75

Manganese 2 to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.75% or over, $1 ton additional.
Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Other Ferroalloys

Ferrotungsten, per lb. contained W. del., carloads	$1.35 to $1.45
Ferrotungsten, less carloads	1.45 to 1.55
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr. per lb. contained Cr. delivered, in carloads	10.00c.
Ferrochromium, 2% carbon	16.50c. to 17.00c.
Ferrochromium, 1% carbon	17.50c. to 18.00c.
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.
Ferrovanadium, del. per lb. contained V.	$2.70 to $2.90
Ferrocarbontitanium, 15 to 18% Ti, 6 to 8% C. f.o.b. furnace carload and contract per net ton	$137.50
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton with $2 unitage	50.00
Ferrophosphorus, electric, 24%, f.o.b. Anniston, Ala., per gross ton with $2.75 unitage	65.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c
Silico spiegel, per ton, f.o.b. furnace, car lots	$38.00
Ton lots or less per ton	45.50
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	90.00
2% carbon grade	95.00
1% carbon grade	105.00
Spot prices	$5 a ton higher

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$11.50 to $12.00
No. 2 heavy melting steel	10.00 to 10.50
No. 2 railroad wrought	11.50 to 12.00
Scrap rails	13.00 to 13.50
Rails, 3 ft. and under	13.50 to 14.00
Compressed sheet steel	11.25 to 11.75
Hand bundled sheet steel	10.00 to 10.50
Hvy. steel axle turnings	10.00 to 10.50
Machine shop turnings	8.00 to 8.50
Short shov. turnings	8.00 to 8.50
Short mixed borings and turnings	6.25 to 6.75
Cast iron borings	6.25 to 6.75
Cast iron carwheels	12.00 to 12.50
Heavy breakable cast	11.50 to 12.00
No. 1 cast	13.00 to 13.50
Railr. knuckles and couplers	14.25 to 14.75
Rail, coil and leaf springs	14.25 to 14.75
Rolled steel wheels	14.25 to 14.75
Low phos. billet crops	15.00 to 15.50
Low phos. sheet bar crops	14.25 to 14.75
Low phos. plate scrap	14.00 to 14.50
Low phos. punchings	14.00 to 14.50
Steel car axles	14.25 to 14.75

CHICAGO

Delivered Chicago district consumers:

	Per Gross Ton
Heavy melting steel	$9.75 to $10.25
Automobile hvy. melt. steel	9.25 to 9.75
Shoveling steel	9.75 to 10.25
Hydraulic comp. sheets	8.75 to 9.25
Drop forge flashings	7.75 to 8.25
No. 1 busheling	9.00 to 9.50
Rolled carwheels	11.00 to 11.50
Railroad tires	12.00 to 12.50
Railroad leaf springs	11.00 to 11.50
Axle turnings	9.25 to 9.75
Steel couplers and knuckles	11.00 to 11.50
Coil springs	12.25 to 12.75
Axle turnings (elec. fur.)	9.75 to 10.25
Low phos. punchings	13.00 to 13.50
Low phos. plates, 12 in. and under	13.00 to 13.50
Cast iron borings	5.00 to 5.50
Short shoveling turnings	5.00 to 5.50
Machine shop turnings	5.25 to 5.75
Rerolling rails	11.00 to 11.50
Steel rails, less than 3 ft.	11.50 to 12.00
Steel rails, less than 2 ft.	13.00 to 13.50
Angle bars, steel	12.00 to 12.50
Cast iron carwheels	10.50 to 11.00
Railroad malleable	12.00 to 12.50
Agricultural malleable	9.50 to 10.00

	Per Net Ton
Iron car axles	$14.50 to $15.00
Steel car axles	13.00 to 13.50
No. 1 railroad grough	8.00 to 8.50
No. 2 railroad wrought	8.75 to 9.25
No. 2 busheling	5.00 to 5.50
Locomotive tires, smooth	10.00 to 10.50
Pipe and flues	5.00 to 5.50
No. 1 machinery cast	9.00 to 9.50
Clean automobile cast	8.50 to 9.00
No. 1 railroad cast	8.00 to 8.50
No. 1 agricultural cast	8.00 to 8.50
Stove plate	6.50 to 7.00
Grate bars	6.50 to 7.00
Brake shoes	6.50 to 7.00

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	*$9.50 to $10.50
No. 2 heavy melting steel	*8.50 to 9.50
Hydraulic compressed, new	9.50 to 10.00
Hydraulic compressed, old	7.00 to 7.50
Steel rails for rolling	12.50 to 13.50
Cast iron carwheels	11.00 to 11.50
Heavy breakable cast	10.50 to 11.00
No. 1 cast	11.00 to 11.50
Stove plate (steel works)	8.00 to 8.50
Machine shop turnings	6.00 to 6.50
No. 1 blast furnace	4.75 to 5.00
Heavy axle turnings	9.00 to 9.50
Cast borings	5.00 to 5.50
No. 1 low phos. heavy	13.75 to 14.25
Couplers and knuckles	13.50 to 14.00
Rolled steel wheels	13.50 to 14.00
Steel axles	15.00 to 16.00
Shafting	17.00 to 17.50
No. 1 railroad wrought	10.00 to 10.50
Spec. iron and steel pipe	8.50 to 9.00
No. 1 forge fire	9.50 to 10.00
Cast borings (chem.)	10.50 to 13.00

* Brokers' buying price for export.

CINCINNATI

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$7.75 to $8.25
No. 2 heavy melting steel	6.25 to 6.75
Scrap rails for melting	7.75 to 8.25
Loose sheet clippings	4.25 to 4.75
Bundled sheets	5.75 to 6.25
Machine shop turnings	4.25 to 4.75
Cast iron borings	4.25 to 4.75
No. 1 busheling	5.75 to 6.25
No. 2 busheling	2.50 to 3.00
Rails for rolling	8.75 to 9.25
No. 1 locomotive tires	7.00 to 7.50
Short rails	11.25 to 11.75
Cast iron carwheels	7.75 to 8.25
No. 1 machinery cast	9.00 to 9.50
No. 1 railroad cast	8.25 to 8.75
Burnt cast	5.75 to 6.25
Stove plate	5.75 to 6.25
Agricultural malleable	7.75 to 8.25
Railroad malleable	8.75 to 9.25

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$9.50 to $10.00
No. 2 heavy melting steel	9.00 to 9.50
Compressed sheet steel	9.00 to 9.50
Light bundled sheet stampings	7.50 to 8.00
Drop forge flashings	8.50 to 9.00
Machine shop turnings	6.25 to 6.75
Short shoveling turnings	6.50 to 7.00
No. 1 busheling	8.50 to 9.00
Steel axle turnings	9.00 to 9.50
Low phos. billet crops	14.00 to 14.50
Cast iron borings	6.50 to 7.00
Mixed borings and short turnings	6.50 to 7.00
No. 2 busheling	6.50 to 7.00
No. 1 cast	12.50 to 13.00
Railroad grate bars	7.00 to 7.50
Stove plate	7.50 to 8.00
Rails under 3 ft.	13.00 to 13.50
Rails for rolling	15.50 to 16.00
Railroad malleable	12.50 to 13.00
Cast iron carwheels	10.75 to 11.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel	$10.75
No. 2 heavy melting scrap	9.75
Scrap rails	11.00
New hydraul. comp. sheets	9.75
Old hydraul. comp. sheets	8.75
Drop forge flashings	9.75
No. 1 busheling	9.75
Hvy. steel axle turnings	$8.00 to 8.50
Machine shop turnings	4.50 to 5.00
Knuckles and couplers	11.50 to 12.00
Coil and leaf springs	11.50 to 12.00
Rolled steel wheels	11.50 to 12.00
Low phos. billet crops	12.00 to 12.50
Short shov. steel turnings	6.00 to 6.50
Short mixed borings and turnings	6.00 to 6.50
Cast iron borings	6.00 to 6.50
No. 2 busheling	6.50
Steel car axles	11.50 to 12.00
Iron axles	11.50 to 12.00
No. 1 machinery cast	11.50 to 12.50
No. 1 cupola cast	10.50 to 11.00
Stove plate	9.00 to 9.50
Steel rails, 3 ft. and under	12.50 to 13.00
Cast iron carwheels	11.00 to 11.50
Industrial malleable	12.00 to 13.00
Railroad malleable	12.00 to 13.00
Chemical borings	8.00 to 8.50

BOSTON

Dealers' buying prices per gross ton:

*No. 1 heavy melting steel	$8.25 to $8.50
No. 1 heavy melting steel	6.15 to 6.65
*Scrap T rails	8.25 to 8.50
Scrap rails	6.40 to 6.65
*No. 2 steel	7.25 to 7.50
No. 2 steel	5.15 to 5.65
Breakable cast	5.25 to 5.50
Machine shop turnings	2.40 to 2.50
*Machine shop turnings (short)	4.50
Bundled skeleton, long	4.50 to 5.00
Forge flashings	5.00 to 5.50
Shafting	11.75 to 12.00
Steel car axles	11.50 to 12.00
Cast iron borings, chemical	6.50 to 7.00
*Stove plate	6.25 to 6.50

Per gross ton delivered consumers' yards:

Textile cast	$9.00 to $9.50
No. 1 machinery cast	9.00 to 9.50
Stove plate	6.00 to 6.50
Railroad malleable	11.00 to 11.50

* Delivered local army base.

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	*$7.00 to †$8.50
No. 2 heavy melting steel	*5.50 to †7.50
Heavy breakable cast	6.00 to 6.50
No. 1 machinery cast	7.00 to 7.50
No. 2 cast	†6.50
Stove plate	†6.25
Steel car axles	13.50 to 14.00
Shafting	12.75 to 13.00
No. 1 railroad wrought	7.00 to 7.50
No. 1 yard wrought, long	6.00 to 6.50
Spec. iron and steel pipe	4.50 to 5.00
Forge fire	5.50 to 6.00
Rails for rolling	8.50 to 9.00
Short shoveling turnings	2.00 to 2.50
Machine shop turnings	2.00 to 2.50
Cast borings	3.50 to 3.75
No. 1 blast furnace	2.00 to 2.50
Cast borings (chemical)	11.00 to 11.50
Unprepared yard iron and steel	4.00 to 4.50

Per gross ton, delivered local foundries:

No. 1 machinery cast	$10.00
No. 1 hvy. cast (cupola size)	9.00
No. 2 cast	7.50

† For direct car loading only.
‡ Loading on barge.

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel	$9.00 to $9.50
Scrap steel rails	10.00 to 10.50
Short shoveling turnings	7.00
Stove plates	7.00
Steel axles	11.50
Iron axles	11.50
No. 1 railroad wrought	7.00
Rails for rolling	12.50
No. 2 cast	9.50 to 10.00
Tramcar wheels	10.00

ST. LOUIS

Per gross ton delivered consumers' yards:

Selected heavy steel	$8.75 to $9.25
No. 1 heavy melting	8.25 to 8.75
No. 2 heavy melting	7.50 to 8.00
No. 1 locomotive tires	9.75 to 10.25
Misc. stand-sec. rails	9.75 to 10.25
Railroad springs	11.00 to 11.50
Bundled sheets	6.00 to 6.50
No. 2 railroad wrought	8.25 to 8.75
No. 1 busheling	5.00 to 5.50
Cast iron borings and shoveling turnings	3.00 to 3.50
Rails for rolling	10.00 to 10.50
Machine shop turnings	2.75 to 3.25
Heavy turnings	5.50 to 6.00
Steel car axles	12.50 to 13.00
Iron car axles	15.00 to 16.00
No. 1 railroad wrought	6.00 to 6.50
Steel rails less than 3 ft.	11.50 to 12.00
Steel angle bars	9.50 to 10.00
Cast iron carwheels	8.00 to 8.50
No. 1 machinery cast	8.50 to 9.00
Railroad malleable	10.50 to 11.00
No. 1 railroad cast	8.00 to 8.50
Stove plate	6.50 to 7.00
Agricult. malleable	8.50 to 9.00

DETROIT

Dealers' buying prices per gross ton:

Heavy melting steel	$7.50 to $8.00
Borings and short turnings	4.25 to 4.75
Long turnings	$3.75 to $4.25
No. 1 machinery cast	11.00 to 11.50
Automotive cast	11.25 to 11.75
Hydraul. comp. sheets	8.00 to 8.50
Stove plate	6.50 to 7.00
New factory busheling	6.50 to 7.00
Old No. 2 busheling	3.75 to 4.25
Sheet clippings	4.75 to 5.25
Flashings	7.00 to 7.50
Low phos. plate scrap	7.50 to 8.00

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	$7.00	$7.00
Rails scrap	8.00	8.00
Machine shop turnings	3.00	3.00
Boiler plate	4.50	4.50
Heavy axle turnings	4.50	4.00
Cast borings	4.00	3.00
Steel borings	2.00	2.00
Wrought pipe	3.50	3.50
Steel axles	7.00	8.00
Axles, wrought iron	7.00	8.00
No. 1 machinery cast	9.00	9.00
Stove plate	5.50	5.00
Standard carwheels	7.25	7.00
Malleable	6.75	7.00

ORES, FLUORSPAR, COKE, FUEL, REFRACTORIES

Lake Superior Ores

Delivered Lower Lake Ports

	Per Gross Ton
Old range, Bessemer, 51.50% iron	$4.80
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi, Bessemer, 51.50% iron	4.65
Mesabi, non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore

C.i.f. Philadelphia or Baltimore

	Per Unit
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algeria	10.50c.
Iron, low phos., Swedish, average 68½% iron	10.50c.
Iron, basic or foundry, Swedish, aver. 65% iron	9.50c.
Iron, basic or foundry, Russian, aver. 65% iron	9.50c.
Manganese, Caucasian, washed 52%	26c.
Manganese, African, Indian, 44-48%	22c.
Manganese, African, Indian, 49-51%	24c.
Manganese, Brazilian, 46 to 48½%	20c.

	Per Net Ton Unit
Tungsten, Chinese, wolframite, duty paid, delivered	$16.00 to $16.50
Tungsten, domestic, scheelite, delivered	17.00

	Per Gross Ton
Chrome, 45% Cr_2O_3, crude, c.i.f. Atlantic Seaboard	$17.50
Chrome, 48% Cr_2O_3, c.i.f. Atlantic Seaboard	20.50
Chrome concentrate, 50% and over Cr_2O_3, c.i.f. Atlantic Seaboard	22.00

Fluorspar

	Per Net Ton
Domestic, washed gravel, 85-5, f.o.b. Kentucky and Illinois mines for all-rail shipment	$13.00 to $14.50
Same grade for Ohio River barge shipment for Kentucky and Illinois River landings	16.00
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	14.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	18.50
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	30.00

COKE, COAL AND FUEL OIL

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville Prompt	$3.25 to $3.50
Foundry, f.o.b. Connellsville Prompt	4.00 to 5.10
Foundry, by-product, Chicago ovens, for delivery outside switching district	8.50
Foundry, by-product, delivered in Chicago switching district	9.25
Foundry, by-product, New England, delivered	11.00
Foundry, by-product, Newark or Jersey City, cst'd	9.24 to 9.72
Foundry, by-product, Phila.	9.00
Foundry, by-product, Cleveland, delivered	9.25
Foundry, Birmingham	6.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00
Foundry, from Birmingham, f.o.b. cars docks, Pacific ports	14.75

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.45 to $1.65
Mine run coking coal, f.o.b. W. Pa.	1.75 to 1.95
Gas coal, ¾-in., f.o.b. Pa. mines	1.85 to 2.35
Mine run gas coal, f.o.b. Pa. mines	1.75 to 1.95
Steam slack, f.o.b. W. Pa. mines	1.00 to 1.25
Gas slack, f.o.b. W. Pa. mines	1.20 to 1.45

Fuel Oil

	Per Gal. f.o.b. Bayonne, N. J.
No. 3 distillate	4.25c.
No. 4 industrial	3.87½c.

	Per Gal. f.o.b. Baltimore
No. 3 distillate	4.25c.
No. 4 industrial	3.87½c.

	Per Gal. del'd Chicago
No. 3 industrial fuel oil	3.38c.
No. 5 industrial fuel oil	3.38c.

	Per Gal. f.o.b. Cleveland
No. 3 distillate	5.50c.
No. 4 industrial	5.25c.
No. 5 industrial	4.25c.

REFRACTORIES

Fire Clay Brick

	Per 1000 f.o.b. Works: High-heat Duty Brick	Intermediate Duty Brick
Pennsylvania	$45.00	$40.00
Maryland	45.00	40.00
New Jersey	50.00 to 55.00	43.00
Ohio	45.00	40.00
Kentucky	45.00	40.00
Missouri	45.00	40.00
Illinois	45.00	40.00
Ground fire clay, per ton	7.00	

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$45.00
Chicago District	56.00
Birmingham	55.00
Silica clay, per net ton	8.00

Chrome Brick

	Per Net Ton
Standard, f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	$45.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	45.00

Magnesite Brick

	Per Net Ton
Standard, f.o.b. Baltimore and Chester, Pa.	$65.00
Chemically Bonded, f.o.b. Baltimore	55.00

Grain Magnesite

	Per Net Ton
Imported, f.o.b. Baltimore and Chester, Pa.	$45.00
Domestic, f.o.b. Baltimore and Chester	40.00
Domestic, f.o.b. Chewelah, Wash.	22.00

Warehouse Prices for Steel Products

PITTSBURGH

Base per Lb.

Plates	3.15c.
Structural shapes	3.15c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.90c.
Cold-finished and screw stock:	
Rounds and hexagons	3.20c.
Squares and flats	3.20c.
Hoops and bands under ¼ in.	3.20c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.30c.
Galv. sheets (No. 24), 25 or more bundles	3.95c.
Hot-rolled sheets (No. 10)	2.95c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$3.69
Spikes, large	2.90c.
Track bolts, all sizes, per 100 count,	65 per cent off list.
Machine bolts, 100 counts,	65 per cent off list.
Carriage bolts, 100 count,	65 per cent off list.
Nuts, all styles, 100 count,	65 per cent off list.
Large rivets, base per 100 lb.	$3.50
Wire, black, soft ann'l'd, base per 100 lb.	*2.70
Wire, galv. soft, base per 100 lb.	*2.925
Common wire nails, per keg	*2.834
Cement coated nails, per keg	*2.834

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 9999 lb.

*Delivered in Pittsburgh switching district.

CHICAGO

Base per Lb.

Plates and structural shapes	3.20c.
Soft steel bars	2.95c.
Cold-fin. steel bars:	
Rounds and hexagons	3.35c.
Flats and squares	3.35c.
Hot-rolled strip	3.30c.
Hot-rolled annealed sheets (No. 24)	3.35c.
Galv. sheets (No. 24)	4.55c.
Hot-rolled sheets (No. 10)	3.05c.
Spikes (keg lots)	3.50c.
Track bolts (keg lots)	4.65c.
Rivets, structural (keg lots)	3.65c.
Rivets, boiler (keg lots)	3.75c.
	Per Cent Off List
Machine bolts	*70
Carriage bolts	*70
Lag screws	*70
Hot-pressed nuts, sq. tap. or	
Hot-pressed nuts, sq. tap or blank	*70
Hot-pressed nuts, hex. tap or	
Hot-pressed nuts, hex. tap or blank	*70
Hex. head cap screws	80
Cut point set screws	70 and 10
Flat head bright wood screws	37½ and 10
Spring cotters	50
Stove bolts in full packages	70
Rd. hd. tank rivets, 7/16 in. and smaller	57½
Wrought washers	$4.50 off list
Black ann'l'd wire per 100 lb.	$3.85
Com. wire nails, base per keg	2.95†
Cement c't'd nails, base per keg	2.95†

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 9999 lb. All prices are f.o.b. consumers' plants within the Chicago switching district.

*These are quotations delivered to city trade for quantities of 100 lb. or more. For lots of less than 100 lb., the quotation is 65 per cent off. Discounts applying to country trade are 70 per cent off, f.o.b., Chicago, with full or partial freight allowed up to 50c. per 100 lb.

†Prices for city and suburbs only.

NEW YORK

Base per Lb.

Plates, ¼ in. and heavier	3.40c.
Structural shapes	3.37c.
Soft steel bars, small shapes	3.26c.
Iron bars	3.26c.
Iron bars, swed. charcoal	6.50c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	3.81c.
Flats and squares	4.31c.
Cold-rolled; strip, soft and quarter hard	3.36c.
Hoops	3.56c.
Bands	3.56c.
Hot-rolled sheet (No. 10)	3.31c.
Hot-rolled ann'l'd sheets (No. 24*)	3.89c.
Galvanized sheets (No. 24*)	4.50c.
Long terne sheets (No. 24)	5.20c.
Standard tool steel	11.00c.
Wire, black annealed (No. 10)	3.40c.
Wire, galv. (No. 10)	3.75c.
Tire steel, 1 x ⅛ in. and larger	3.65c.
Open hearth spring steel	4.00c. to 10.00c.
Common wire nails, base, per keg	$3.21
	Per Cent Off List
Machine bolts, cut thread: All diameters	65 and 10
Carriage bolts, cut thread: All diameters	65 and 10
Boiler tubes:	Per 100 Ft.
Lap welded, 2-in.	$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	63.65

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

Base per Lb.

Plates and struc. shapes	3.45c.
Bars, soft steel or iron	3.20c.
Cold-fin. rounds, shafting, screw stocks	3.75c.
Hot-rolled annealed sheets (No. 24)	4.10c.
Galv. sheets (No. 24)	4.65c.
Hot-rolled sheets (No. 10)	3.30c.
Black corrug. sheets (No. 24)	4.10c.
*Galv. corrug. sheets	4.65c.
Structural rivets	4.00c.
Boiler rivets	4.10c.
	Per Cent Off List
Tank rivets, 7/16 in. and smaller	55
Machine and carriage bolts, lag screws fittings up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts: All quantities	70

*No. 26 and lighter take special prices.

PHILADELPHIA

Base per Lb.

*Plates, ¼-in. and heavier	2.98c.
*Structural shapes	2.98c.
*Soft steel bars, small shapes, iron bars (except bands)	2.93c.
‡Reinforc. steel bars, sq. twisted and deformed	2.96c.
Cold-finished steel bars	3.61c.
*Steel hoops	3.43c.
*Steel bands, No. 12 and 3/16 in., incl.	3.18c.
Spring steel	5.00c.
†Hot-rolled anneal. sheets (No. 24)	3.65c.
†Galvanized sheets (No. 24)	4.30c.
*Hot-rolled annealed sheets (No. 10	3.08c.
Diam. pat. floor plates, ¼ in.	4.95c.
Swedish iron bars	6.25c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

*Base prices subject to deduction on orders aggregating 4000 lb. or over.

†For 50 bundles or over.

‡For less than 2000 lb.

CLEVELAND

Base per Lb.

Plates and struc. shapes	3.31c.
Soft steel bars	2.95c.
Reinforc. steel bars	2.10c.
Cold-finished steel bars	3.25c.
Flat-rolled steel under ¼ in.	3.36c.
Cold-finished strip	†3.00c.
Hot-rolled annealed sheets (No. 24)	3.96c.
Galvanized sheets (No. 24)	4.61c.
Hot-rolled sheets (No. 10)	3.11c.
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.56c.
Black ann'l'd wire, per 100 lb.	$2.65
No. 9 galv. wire, per 100 lb.	3.00
Com. wire nails, base per keg	2.40

†Outside delivery 10c. less.

CINCINNATI

Base per Lb

Plates and struc. shapes	3.42c.
Bars, soft steel or iron	3.17c.
New billet reinforc. bars	3.25c.
Rail steel reinforc. bars	3.25c.
Hoops and bands, 3/16 in. and lighter	3.47c.
Cold-finished bars	3.57c.
Hot-rolled annealed sheets (No. 24)	4.02c.
Galv. sheets (No. 24)	4.72c.
Hot-rolled sheets (No. 10)	3.22c.
Structural rivets	4.35c.
Small rivets	55 per cent off list
No. 9 ann'l'd wire, per 100 lb. (1000 lb. or over)	$2.88
Com. wire nails, base per keg:	
Any quantity less than carload	3.04
Cement c't'd nails, base 100-lb. keg	3.50
Chain, 1-in., per 100 lb.	8.35
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$22.66
4-in.	48.14
Lap-welded steel boiler tubes, 2-in.	19.35
4-in.	45.30

BUFFALO

Base per Lb.

Plates	3.38c.
Struc. shapes	3.35c.
Soft. steel bars	3.00c.
Reinforcing bars	2.60c.
Cold-fin. flats and sq.	3.40c.
Round and hex.	3.40c.
Cold-rolled strip steel	3.19c.
Hot-rolled annealed sheets (No. 24)	4.06c.
Heavy hot-rolled sheets, 3/16 in., 24 to 48 in. wide	3.63c.
Galv. sheets (No. 24)	4.70c.
Bands	3.43c.
Hoops	3.43c.
Heavy hot-rolled sheets	3.18c.
Com. wire nails, base per keg	$3.35
Black wire, base per 100 lb. (2500-lb. lots or under)	3.55
(Over 2500 lb.)	3.45

BOSTON

Base per Lb.

Reams, channels, angles, tees, zees	3.54c.
H beams and shapes	3.54c.
Plates—sheered, tank and univ. mill, ¼ in. thick and heavier	3.56c.
Floor plates, diamond pattern	5.36c.
Bar and bar shapes (mild steel)	3.35c.
Bands 3/16 in. thick and No. 12 ga. incl.	3.65c. to 4.65c.
Half rounds, half ovals, ovals and bevels	4.60c.
Tire steel	4.60c.
Cold-rolled strip steel	3.245c.
Cold-finished rounds, squares and hexagons	3.90c.
Cold-finished flats	3.75c.
Blue annealed sheets, No. 10 ga.	3.65c.
One pass cold-rolled sheets No. 24 ga.	4.20c.
Galvanized steel sheets, No. 24 ga.	4.90c.
Lead coated sheets, No. 24 ga.	5.85c.

Prices delivered by truck in metropolitan Boston, subject to quantity differentials.

DETROIT

Base per Lb.

Soft steel bars	3.04c.
Structural shapes	3.42c.
Plates	3.42c.
Floor plates	5.17c.
Hot-rolled annealed sheets (No. 24)	3.94c.
Hot-rolled sheets (No. 10)	3.14c.
Galvanized sheets (No. 24)	4.72c.
Bands	3.39c.
Hoops	3.39c.
Cold-finished bars	3.49c.
Cold-rolled strip	3.18c.
Hot-rolled alloy steel (S.A.E. 3100 Series)	5.29c.*
Bolts and nuts	70 and 5 per cent off list

Prices delivered by truck in metropolitan Detroit, subject to quantity differentials.

* Price applies to 1,000 lb. and over.

MILWAUKEE

Base per Lb

Plates and structural shapes	3.31c.
Soft steel bars	3.06c.
Hot-rolled strip	3.41c.
Hot-rolled sheets (No. 10)	3.16c.
Hot-rolled annealed sheets (No. 24)	3.96c.
Galvanized sheets (No. 24)	4.66c.
Cold-finished steel bars	3.61c.
Cold-rolled strip	3.30c.
Structural rivets (keg lots)	3.86c.
Boiler rivets (keg lots)	3.96c.
Track spikes (keg lots)	3.71c.
Track bolts (keg lots)	4.86c.
Black annealed wire	3.10c.
Com. wire nails	2.90c.
Cement coated nails	2.90c.
	Per Cent Off List
Machine bolts	70
Carriage bolts	70
Hot-pressed nuts, sq. and hex., tapped or blank (keg lots)	70

Prices given above are delivered Milwaukee.

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 9999 lb. On galvanized and No. 24 hot-rolled annealed sheets the prices given apply on order of 400 to 3499 lb. On cold-finished bars the prices are for orders of 300 to 499 lb.

ST. PAUL

Base per Lb.

Mild steel bars	3.20c.
Structural shapes	3.45c.
Plates	3.45c.
Cold-finished bars	3.87c.
Bands and hoops	3.55c.
Hot-rolled annealed sheets, No. 24	3.90c.
Galvanized sheets, No. 24	4.50c.
Cold-rolled sheets, No. 20	4.95c.

On mild steel bars, shapes, plates and hoops and bands the base applies on 400 to 14,999 lb. On cold-finished bars, hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over.

BALTIMORE

Base per Lb.

*Mild steel bars	2.95c.
*Iron bars	2.95c.
*Reinforcing bars	2.95c.
*Structural shapes	3.00c.
†Plates	3.00c.
†Hot-rolled sheet, No. 10	3.10c.
Hot-rolled annealed sheets, No. 24	3.60c.
Galvanized sheets, No. 24	4.30c.
*Bands	3.20c.
*Hoops	3.45c.
Cold-rolled rounds	3.58c.
Cold-rolled squares, hex. and flats	3.58c.
Rivets	4.40c.
Bolts and nuts, per cent off list	60 and 10

*Quantity extras per size apply. †Quantity extras per thickness apply. Hot-rolled quantity extras are: 2000 lb. and over, base; 1500 lb. to 1999 lb., add 15c. per 100 lb.; 1000 lb. to 1499 lb., add 30c.; 0 to 999 lb., add 50c.

CHATTANOOGA

Base per Lb.

Mild steel bars	3.31c.
Iron bars	3.31c.
Reinforcing bars	3.31c.
Structural shapes	3.56c.
Plates	3.56c.
Hot-rolled sheets, No. 10	3.36c.
Hot-rolled annealed sheets, No. 24	4.21c.
Galvanized sheets, No. 24	4.86c.
Steel bands	3.61c.
Gold-finished bars	3.98c.

MEMPHIS

Base per Lb.

Mild steel bars	3.41c.
Shapes, bar size	3.41c.
Iron bars	3.41c.
Structural shapes	3.66c.
Plates	3.66c.
Hot-rolled sheets, No. 10	3.46c.
Hot-rolled annealed sheets, No. 24	4.26c.
Galvanized sheets, No. 24	4.96c.
Steel bands	3.71c.
Cold-drawn rounds	3.85c.
Cold-drawn flats, squares, hexagons	6.45c.
Structural rivets	4.25c.
Bolts and nuts, per cent off list	65
Small rivets, per cent off list	50

PACIFIC COAST

Base per Lb.

	San Francisco	Los Angeles	Seattle
Plates, tank and U. M.	3.55c.	3.60c.	3.55c
Shapes, standard	3.55c.	3.60c.	3.55c.
Soft steel bars	3.60c.	3.60c.	3.60c.
Reinforcing bars, f.o.b. cars dock Pacific ports	2.45c.	2.45c.	2.45c.
Hot-rolled annealed sheets (No. 24)	4.40c.	4.35c.	4.40c
Hot-rolled sheets (No. 10)	3.75c.	3.70c.	3.75c.
Galv. sheets (No. 24)	5.00c.	4.95c.	5.00c.
Cold finished steel: Rounds	5.95c.	5.85c.	6.00c.
Squares and hexagons	7.20c.	7.10c.	7.25c.
Flats	7.70c.	7.60c.	8.25c.
Common wire nails —base per keg less carload	$3.30	$3.40	$3.30

All items subject to differentials for quantity.

TOOL STEEL

Prices are same for warehouse distribution at all points on or East of Mississippi River. West of Mississippi quotations are 1c. a lb. higher.

Base per Lb.

High speed	57c.
High carbon chrome	37c.
Oil hardening	22c.
Extra	17c.
Regular	14c

Lead Prices Marked Up $3 a Ton to 4c., St. Louis — Copper Holds at 8c.

Demand for Tin Continues Active at Highest Prices Since Last August—Zinc Holding Despite Unfavorable June Statistics

NEW YORK, July 9.—The copper market has been well maintained at 8c. a lb., delivered Connecticut Valley, during the past week. With sales averaging more than 1000 tons daily, producers feel that a further decline is now unlikely. The situation has also been aided by recent strength in the foreign market, where sales have been made around the 7½c. level. The market today is quotable at 7.50c. a lb., usual Continental base ports, but price fluctuations yesterday amounted to as much as 15 points. Sellers here believe that the half-cent spread between the domestic and foreign markets is not out of line, but demand here would have to improve considerably before an advance would be attempted even though the foreign market moved higher. A favorable aspect of recent purchasing has been the predominance of July and August copper. This indicates that consumers' stocks are probably at a low level. "Outside" copper is not a very active factor in the market, and is not being offered at less than 7.75c. a lb.

Tin

The holiday interruption affected tin sales during the last week, but demand is still fairly good. No particular position or delivery is being called for and there is some demand for November and December tin. In the meantime, prices on Straits tin at New York have risen over the 52c. level. This has been partly due to the strength in sterling which raised the quotation today to 52.37½c. a lb., the highest since Aug. 17, 1934. London prices are also strong, particularly for Straits metal, which was quoted this morning at £244 15s. This would be equivalent to 54½c. a lb. at New York. Standard tin was posted in London this morning at £230 15s. for spot and £224 10s. for futures, while the market in the East was £230 10s.

Lead

The market has been marked up $3 a ton during the past week in three successive advances of five points each. The increase announced today brought the contract prices to 4c. a lb., St. Louis, and 4.15c., New York, while the leading interest is asking $1 a ton premium on sales in the East. This relationship was established on Friday when the American Smelting & Refining Co. raised prices five points without similar action by the St. Joseph company. Current quotations are still $4 a ton under the maximum figures which prevailed for a day or two in late May. Demand is well sustained and is about one-third for July metal and two-thirds for August. Practically all consuming industries are in the market and the fact that many of them are still buying July lead indicates that they are not as heavily covered as had been thought at the beginning of the month.

Zinc

While publication of June statistics yesterday indicated an increase of more than 5000 tons in stocks, it was learned in the trade that stocks of Prime Western actually showed a decrease of more than 1000 tons. The stock addition was thus more than accounted for by the higher-grade metals. Zinc production last month amounted to 34,677 net tons, compared with 34,597 tons in May, while June shipments totaled only 29,393 tons, against 35,652 tons in the preceding months. In the first half of the year production was 209,987 tons and shipments were 215,083 tons. A decrease of nearly 9000 tons in unfilled orders during June was considered a bullish factor. Sales of zinc are fairly well sustained, transactions in Prime Western last week having totaled 3750 tons. This was about the same as in the preceding week and compares with only 1450 tons in the week before. The ore market is holding at $27 and $28 a ton. Output last week totaled 6400 tons against shipments of 6500 tons and sales of 6250 tons.

The Week's Prices. Cents Per Pound for Early Delivery

	July 3	July 5	July 6	July 8	July 9
Electrolytic copper, N. Y.*	7.75	7.75	7.75	7.75	7.75
Lake copper, N. Y.	8.12½	8.12½	8.12½	8.12½	8.12½
Straits tin, spot, New York	51.90	51.90	....	52.20	52.37½
Zinc, East St. Louis	4.30	4.30	4.30	4.30	4.30
Zinc, New York†	4.67½	4.67½	4.67½	4.67½	4.67½
Lead, St. Louis	3.85	3.90	3.90	3.95	4.00
Lead, New York	4.00	4.05	4.05	4.10	4.15

*Refinery quotations; price ¼c. higher delivered in Connecticut.
†Includes emergency freight charge.

Aluminum, virgin 99 per cent plus, 19c. to 21c. a lb., delivered.
Aluminum, No. 12 remelt, No. 2 standard, in carloads, 16.25c. a lb., delivered.
Nickel, electrolytic, 35c. to 36c. a lb. base refinery, in lots of 2 tons or more.
Antimony, Asiatic, 12.75c. a lb., New York.
Brass ingots, commercial 85-5-5-5, 8c. a lb., delivered; in Middle West ¼c. a lb. is added on orders for less than 40,000 lb.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	53.25c. to 54.25c.
Tin, bar	55.25c. to 56.25c.
Copper, Lake	9.00c. to 10.00c.
Copper, electrolytic	9.00c. to 9.50c.
Copper, castings	8.75c. to 9.75c.
*Copper sheets, hot-rolled	15.00c.
*High brass sheets	13.62½c.
*Seamless brass tubes	15.37½c.
*Seamless copper tubes	15.25c.
*Brass rods	12.12½c.
Zinc, slabs	5.75c. to 6.75c.
Zinc, sheets (No. 9), casks, 1200 lb. and over	10.25c.
Lead, American pig	4.62½c. to 5.62½c.
Lead, bar	5.62½c. to 6.62½c.
Lead, sheets	7.75c.
Antimony, Asiatic	13.50c. to 14.50c.
Alum., virgin, 99 per cent, plus	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent.	18.00c. to 19.00c.
Solder, ½ and ½	29.50c. to 30.50c.
Babbitt metal, commercial grades	25.00c. to 60.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

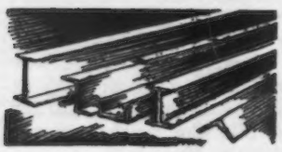
Tin, Straits pig	56.00c.
Tin, bar	58.00c.
Copper, Lake	9.00c.
Copper, electrolytic	9.00c.
Copper, castings	8.25c.
Zinc, slabs	5.85c. to 6.10c.
Lead, American pig	4.65c. to 5.00c.
Lead, bar	8.00c.
Antimony, Asiatic	15.00c.
Babbitt metal, medium grade	19.25c.
Babbitt metal, high grade	60.00c.
Solder, ½ and ½	32.75c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	5.62½c.	6.37½c.
Copper, hvy. and wire	5.50c.	6.00c.
Copper, light and bottoms	4.50c.	5.00c.
Brass, heavy	3.00c.	3.62½c.
Brass, light	2.25c.	3.00c.
Hvy. machine composition	4.87½c.	5.37½c.
No. 1 yel. brass turnings	4.00c.	4.50c.
No. 1 red brass or compos. turnings	4.25c.	4.75c.
Lead, heavy	2.87½c.	3.25c.
Zinc	2.25c.	2.62½c.
Cast aluminum	10.62½c.	11.75c.
Sheet aluminum	12.00c.	13.50c.

Eastern Pennsylvania Rate Declines to 27 Per Cent



Bids Asked on 2600 Tons of Piling—Japanese Scrap Orders Are Being Liquidated; Prices Unchanged

PHILADELPHIA, July 9.—All district buyers are adhering to a fixed policy of ordering only for immediate use. Inasmuch as consumption is now at a low level, steel sales are likewise at a minimum. In fact, total steel bookings are so poor, even for this period of the year, that all sellers feel that any change must be for the better. So far prices have held to published levels, but some buyers continue to seek preferential treatment on larger orders.

Open-hearth schedules failed to regain all of the losses experienced during the holiday period. Most of the smaller district mills are melting in unchanged volume but report fairly heavy stocking of ingots. The principal producer in this area has cut its output, thereby lowering the district rate four points to 27 per cent of potential capacity. It is expected that Bethlehem's Steelton plant may soon take off its active three open-hearths.

Practically all steel sellers here expect better business in the fall, with improvement to begin some time in August. This prediction is based largely on the expectation of a usual surge in automobile assemblies, an improvement in miscellaneous buying, additional Government naval construction at nearby shipyards, possible development of railroad buying for rolling stock repair, and larger releases of Federal money for road building. This latter outlet at present looks increasingly promising. More than $364,600 will soon be spent to recondition Coast Guard stations in Delaware and New Jersey. Allocation of $1,503,000 for construction of patrol boats in local shipyards is soon expected, and Pennsylvania is looking forward to an early allotment of $3,591,000 for road construction.

Pig Iron

Jobbing foundries report a sustained summer demand for castings in a volume much better than had been expected. The average melting rate in this district is, however, far from satisfactory. All foundries are buying for nearby shipment, and furnaces report that the greater portion of their bookings are made up of carlot miscellaneous orders. It is probable that total July shipments will be slightly under those for June. Imports of iron into this district this year have been slightly under those a year ago. Total imports into the United States amounted to 23,174 tons in May, and 46,903 tons for the five months since the turn of the year. Imports for the first five months of 1934 totaled 60,218 tons.

Sheets and Strip

Small district mills producing blue-annealed sheets report a decline in demand during the past fortnight. Underground oil storage tank fabricators usually experience a pickup in business late in August and this improvement should be reflected in sheet demand. Full-finished sheets are almost inactive, with the exception of light buying by warehouses and small consumers. At present the local auto body stamping plants are preparing for August production and are also starting to inquire about prices on the large quantities of wide sheets which they will need in the fall. Strip sales are confined to occasional tonnages for warehouses, miscellaneous consumers, radio makers, etc.

Bars, Plates and Shapes

Pennsylvania and New Jersey continue to divert road construction funds relief and sellers of shapes and bars are experiencing very low demand for this season of the year. Bar sellers have little or no business in prospect, but about 12,000 tons of shapes is active. Included are 10,000 tons for the Department of the Interior Building addition at Washington, 1000 tons for a post office at Wilmington, Del., and 700 tons for a post office at Atlantic City, N. J. Sellers of plates continue to subsist entirely on miscellaneous small-lot demand. The one award of the week was secured by Lancaster Iron Works and called for 228 tons of plate for 10,000 ft. of welded pipe to be installed at Fort Mifflin, Philadelphia. United States army engineers advertised on Friday for bids on 2600 tons of piling for a jetty in the Wilmington, Del., harbor. This is the largest piling job released in this area for a number of years. In the two days since the original advertisement, more than 30 sets of plans have been taken out, indicating the large number of tenders which will be submitted.

Warehouse Business

In this area, June turnover averaged about 10 per cent under the volume for May. The recent holiday period has restricted July business to some extent, but most local warehouses are hoping for an average July demand about equivalent to that for June. No particular commodity is outstanding. All prices are exceptionally firm considering the competition for what business there is available.

Imports

The following iron and steel imports were received here last week: 24 tons of steel bars, 7 tons of steel tubes, 29 tons of steel wire and 2 tons of steel forgings, all from Sweden.

Scrap

July will probably be an exceptionally heavy month for scrap deliveries to Japan and Italy, with five or six boats leaving this port. However, there is every indication that August will be a slack month. Japan has been out of the market for about a month and principal buyers have stated that no new commitments will be forthcoming for at least two months because of the decline in finished steel demand and in domestic prices in that country. Seaboard brokers will have shipped out a great proportion of

American Can Co. Developed New Beer Container

IN THE IRON AGE of July 4, on page 28, was an article depicting the probable new outlet for tin plate arising from the development of a satisfactory metal beer container. The article omitted to mention that the American Can Co. sponsored this achievement. Credit should go to this company for successfully solving the difficult problems connected with producing a container suitable for this purpose.

old Japanese contracts by the end of the month. Italy is now a more active purchaser of No. 2 steel, but the requirements of that country are far below those of Japan. Very little steel is currently going into domestic consumption. Bethlehem is paying as high as $10, delivered at Bethlehem, for No. 1 from dealers, and continues to buy No. 1 and No. 2 for Baltimore at $10 and $9 a ton respectively. A boat is now loading 5000 tons of steel at Baltimore for Japanese delivery.

Bale Tie Movement Begins at St. Louis

ST. LOUIS, July 9.—The movement of bale ties has begun, but the possibilities are that it will not be on so large a scale as last year, as farmers are reported to be not saving as much alfalfa and clover because of the abundance of other fodders. Although mill prices on barbed wire and nails are firm, the resale price is said to be weak, as a result of jobbers using these items as "leaders," to stimulate general business. The Owens-Illinois Glass Co. has awarded 400 tons of structural steel to McClintic-Marshall Corpn. for a leer building at Alton, Ill.

The scrap market is extremely dull, and it is predicted that it will continue so for the remainder of July. Mills are not inclined to buy for the present. In the meantime, the market holds firm, and prices are unchanged. Dealers report that offerings of scrap are very light. Railroad lists are scarce, and the lines are producing only small tonnages. Missouri Pacific has a list of 40 carloads, closing this week.

Pig iron shipments are light, and it is not expected there will be any considerable amount bought during this month. The melt is lower, one mill closing over the holidays.

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Operations Rise At Buffalo

BUFFALO, July 9.—Bethlehem's Lackawanna plant is operating six open-hearths. Republic Steel Corpn., which was down part of last week, is operating three open-hearths and may go to four before the end of the week. Wickwire-Spencer Steel Corpn. continues to operate one. The Seneca sheet division of Bethlehem is operating at about 60 per cent.

Pig iron business quiet, with no sizable lot being reported. A fair amount of small tonnage is being placed.

The scrap market continues fairly firm. Dealers here are continuing to accumulate scrap in preparation for what they believe will be a heavy movement of scrap in the fall. A few sales of short rails at $13.50 and No. 1 machinery cast at $11.50 to $12 were made in what is usually the poorest week of the year with the exception of the last week. Dealers state they can get profitable prices from dealers who are endeavoring to cover against Youngstown orders.

Only small-sized tonnage was taken in the fabricated structural field.

Los Angeles to Take Bids on Large Job

SAN FRANCISCO, July 9.—The Metropolitan Water District will open bids Aug. 3 at Los Angeles for constructing Cajalco dam, dike and tunnels near Riverside, Cal. The district estimates requirements at 5125 tons of bars, 810 tons of steel pipe, 105 tons of shapes and 290 tons of miscellaneous steel.

Weekly Indications of Steel Activity

From THE IRON AGE

	July 9, 1935	July 2, 1935	June 11, 1935	July 10, 1934	Average, Year to Date 1935	1934
Steel ingot operations—Per cent of capacity	36.5	32.0	39.5	27.0	45.6	46.8
	Week Ended				Year to Date	
	July 9, 1935	July 2, 1935	June 11, 1935	July 10, 1934	1935	1934
Fabricated structural steel awards	21,800	7,000	12,915	20,300	361,352	457,220
Fabricated plate awards	1,185	2,475	2,800	2,260	59,357	79,172
Sheet steel piling awards	0	0	0	13,000	23,365	37,240
Reinforcing bar awards	920	4,400	1,980	2,900	113,675	113,785

Cleveland Rate Advances To 32 Per Cent

Despite Post-Holiday Recovery, Demand Shows Downward Tendency, Especially from Automotive Trade—Bids Taken on Large Muskingum District Jobs

CLEVELAND, July 9.—Steel plants in the Cleveland-Lorain territory resumed operations this week with an ingot output of 32 per cent of capacity, a decline of nine points from the rate of operations before the holiday week curtailment. Each of the three plants in the territory has one less open-hearth furnace in operation than during the last week in June.

Accumulation of orders during the partial shutdown last week permitted sheet mills to step up production somewhat this week. The volume of business in finished steel still shows a moderate downward tendency. Forge shops and other plants in this territory making automobile parts are getting cleaned up on orders for parts for old models and are ordering very little steel. Mills have received some small-lot orders for sheets for new automobile models. However, with little activity in the motor car industry and a lull in the construction field, no sizable tonnages of steel were placed during the week.

Bids for several Muskingum District Conservancy projects requiring a considerable tonnage of steel have been taken by United States Engineers, Zanesville, Ohio, but awards have not been made. The largest from the standpoint of steel requirements is the relocation of the Wheeling & Lake Erie tracks at Dover, Ohio, for which the Arundel Corpn., Baltimore, is low bidder. This will require 4968 tons of new rails, 590 tons of new billet steel reinforcing bars and a considerable tonnage of splice bars, tie plates, spikes and track bolts.

Stainless steel took a spurt with the placing of three carload orders by three consumers in this territory during the week. This breaks all previous size records in stainless steel orders placed here with the exception of one lot purchased for making beer barrels.

Pig Iron

The slump in the demand has not materialized to the extent that was expected. July shipments so far have been in about the same volume as during the corresponding period of June and a fair number of sales are being made in lots ranging from car lots to 300 tons. Foundries doing automotive work are taking some iron. Southern foundry iron is being bought in small lots. Shipments of foundry coke indicate that foundry operations generally are being maintained at recent volume.

Sheets

Orders for small lots of sheets in new sizes, indicating that they are for new models, have come from the automobile manufacturers, who also are still buying small lots to round out their stocks for present models. Galvanized sheets continue to move fairly well to fabricators of building material. Miscellaneous demand is light. The local sheet mill is operating at 50 per cent of capacity this week, and the Monroe, Mich., plant is operating at full capacity after being shut down a week.

Strip Steel

New releases of hot and cold-rolled strip have come from General Motors parts plants against orders placed near the end of June. While business generally is light, it is holding closely to recent volume. Additional orders have come from shovel manufacturers, who expect that the Government work relief program will stimulate their sales. The Cleveland cold strip mill is operating at 45 per cent of capacity this week.

Bars, Plates and Shapes

Bids for 11 railroad bridges in connection with the Muskingum District Conservancy project, requiring 2100 tons of structural shapes, will be taken July 11 by the United States Engineers, Zanesville, Ohio. Bids have been taken for relocating railroad tracks in connection with the same project, requiring some rails, reinforcing bars and structural steel. Bids will be taken in August for two Federal housing projects in Cleveland that will require a considerable tonnage of reinforcing steel. The Nickel Plate Railroad has placed a bridge requiring 918 tons. New inquiry in the construction field is very light. A Port Huron, Mich., breakwater will take 250 tons of steel piling. While little steel bar business is coming from the automotive industry, orders from miscellaneous consumers continue fair.

Scrap

The market is dull but firm. Prices of steel-making grades are being sustained by purchases by dealers to fill the large orders they

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recently took from a Youngstown district consumer. These purchases are being made at $11.50 for No. 1 heavy melting steel and $10.75 for No. 2, and these prices apparently are bringing out a plentiful supply of scrap. Cupola cast scrap is firmer. The July scrap lists of leading automobile companies, which were closed during the week, were much smaller than recently. New York Central and Erie have lists out against which they will take bids this week.

Pilot Grove, Mo., plans pipe lines for water system and other waterworks installation. Fund of $37,000 is being arranged through Federal aid. W. B. Rollins & Co., Railway Exchange Building, Kansas City, Mo., are consulting engineers.

Lisbon, Ohio, is planning for about 3000 ft. of new pipe lines for replacements in present system; also for motor-driven pumping equipment and accessories. Cost about $15,000. Board of Public Affairs in charge.

Garland City, Utah, plans pipe lines for water supply, including replacements in present system. Fund of $50,000 is being arranged through Federal aid for this and other waterworks improvements.

Bogota, Tex., plans pipe lines for water system; also installations of pumping machinery and other waterworks equipment. Financing is being arranged. Municipal Engineering Co., Burt Building, Dallas, Tex., is consulting engineer.

Seattle, Wash., has awarded 100 tons through a general contractor's letting.

Heber City, Utah, has opened bids on 256 tons of 16-in.

Cast Iron Pipe

New York has purchased 3600 tons of 6 to 20-in. cement-lined pipe from United States Pipe & Foundry Co., 1600 tons from R. D. Wood & Co., and 600 tons from Donaldson Iron Works.

Chicago will take bids July 16 on 1600 tons of 6 to 16 in. class B.

Tucson, Ariz., plans pipe lines for extensions in water system. Cost about $450,000. Financing in such amount is being arranged through Federal aid.

Hartsville, Tenn., closes bids July 17 for pipe lines for water supply and other waterworks construction. Financing has been arranged. Freeland, Roberts & Co., Independent Life Building, Nashville, Tenn., are consulting engineers.

Dwight, Neb., plans water pipe lines. Special election will be held soon to approve bonds for this and other waterworks installation.

Mendon, Ill., plans pipe lines for water system and other waterworks construction. Fund of $44,000 is being arranged through Federal aid. Russell & Axon, 4903 Delmar Boulevard, St. Louis, are consulting engineers.

Brent, Ala., will soon ask bids for pipe for water system and other waterworks construction. Cost about $30,000. Financing has been arranged through Federal aid. J. B. McCrary & Co., Marietta Street Building, Atlanta, Ga., are consulting engineers.

Roseville, Cal., plans pipe lines for main water supply, comprising second section of water project for municipality. Fund of $50,000 has been secured through Federal aid.

Dunkirk, N. Y., plans pipe lines for water system, replacing present old pipe. Surveys are under way. A. G. Walter is city engineer in charge.

Ruthton, Minn., plans water pipe lines and other waterworks installation. Bids will be asked soon. Cost about $30,000. Druar & Milinowski, Globe Building, St. Paul, Minn., are consulting engineers.

Madisonville, Ky., plans about 10,000 ft. of 10-in. and 600 ft. of 6-in. for water system; also 250,000-gal. elevated steel tank. J. S. Watkins, Citizens' Bank Building, Lexington, Ky., is consulting engineer.

Midway, Ky., closes bids July 17 for pipe lines for water supply and other waterworks installation. Howard K. Bell, Lexington, Ky., is consulting engineer.

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Steel Demand at New York Resumes Pre-Holiday Level

Business Still Slow With Local Public Works Program Discouraging—Some Large Tonnage Purchases Being Deferred As Price Structure Is Maintained

NEW YORK, July 9.—Demand for finished steel in this district is being maintained at about the same level which prevailed before the week-end holiday. Business last week was extremely light, as had been generally anticipated, but buyers are again in the market for their immediate needs and aggregate volume is being sustained. One exception is offered by tin plate, for which releases have declined following heavy June specifications. July tonnage is expected to be confined largely to fill-in lots.

The car builders which shared in the recent Chesapeake & Ohio freight car order have not yet allocated the required steel. This is also true in the case of the cars recently bought for the New York subway system. New York contractors with steel to place on recently let public works jobs are also deferring purchases and in some cases are shopping around for lower prices. Pressure for price shading from the general run of steel consumers is negligible.

Steel sellers in this territory are somewhat disappointed by the prospective steel requirements of the new public works jobs which have been announced for New York. School construction will involve a fair amount of steel but swimming pools, park improvements and other projects will call for labor rather than materials in accordance with the wishes of the Administration.

No large tonnage jobs are in immediate prospect in this district, although a section of the West Side elevated highway in New York from Forty-eighth to Fifty-ninth Street will come out for bids in the near future. It will require from 12,000 to 15,000 tons of reinforcing bars and structural shapes. Extension of this highway from Canal Street to the Battery will also take a large tonnage, but will not likely come out this year.

The New York Central System took bids last week on its quarterly miscellaneous requirements, but specific tonnages were not involved. The Delaware, Lackawanna & Western has bought 1500 to 2000 tons of maintenance track supplies. Several railroads in the vicinity will soon begin to take bids on grade crossing elimination projects in New York and New Jersey. Shipbuilders are already sounding out the market for plate and shape requirements of the Navy's construction program on which bids will be taken at Washington early in August.

With the steel code definitely a thing of the past, the character of business has changed much less than many had anticipated. It is now apparent, however, that the industry expects to take no definite action regarding official extension of code practices. No effort will be made to secure a voluntary code under the devitalized NRA, and it is not likely that application for operation under the Federal Trade Commission Act will be made. While no official action has been taken by the industry since the passing of old NRA, it is believed that legal counsel is still considering possible means of salvaging the best features of the code.

Pig Iron

Many foundries in this area report a pickup in orders for castings, and this improvement is being reflected in improved sales of iron. Total bookings last week amounted to 2550 tons, of which 500 tons was malleable iron for immediate New England delivery. Sales in the preceding weekly period totaled 2200 tons, and 2100 tons was sold in the period a fortnight ago. New York State's new law on occupational diseases, effective Sept. 1, will throw an additional burden on smaller foundries in this State. Some of these foundries have even threatened to move to nearby States. New Jersey's law is equally as severe, but Pennsylvania's statutes covering the subject are considered more equitable.

Cast Iron Pipe

New business is very slack. The largest single award for many months was made last week when New York purchased 3600 tons of 6 to 20-in. cement-lined pipe from United States Pipe & Foundry Co., 1600 tons from R. D. Wood & Co. and 600 tons from Donaldson Iron Works. All bidders on this pipe adhered closely to published price levels, indicating that makers are not prone to shade prices even in

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this period of poor demand. At present there are no important lots of iron pipe out for bidding, and selling is confined to spotty small-tonnage lots to miscellaneous users.

Reinforcing Steel

Day-to-day, small-tonnage purchasing is currently considerably under expectations, and there have been no tonnage awards during the past week. There are, however, a few very attractive parcels pending which should be let within the next fortnight. These include 200 tons of mesh for a State highway in Niagara County, N. Y., and 500 tons of mesh for Queens County, N. Y. A sewer in Queens, requiring 850 tons of bars, will soon be let, and distributers expect an early award of the 1390 tons of bars for the approach to the Midtown Tunnel, New York. This latter project may take an additional 900 tons of bars for the tunnel lining if the present plan of substituting steel for cast iron is followed out.

Scrap

This market is still somewhat uncertain as a reflection of the holiday shutdown and reduction in barge loadings in Brooklyn due to a strike of yard sorters and handlers. All prices appear to be steady with no indication of a trend either up or down. Small tonnages of turnings are being loaded for Pittsburgh, a little stove plate is going to Bayonne, N. J., and one broker continues to ship No. 2 steel to Buffalo by water. The export market continues in a state of flux. Italy is now the principal buyer as Japan continues practically out of the market. The latter country is now suffering from a buyers' strike on steel products brought about by anticipation of lower prices due to increased production and compulsory reduction of prices on finished steel ordered by Government authority. Italy, on the other hand, is badly in need of scrap and is generally willing to meet brokers' bids on new business. Loadings on old Italian and Japanese contracts are in unchanged volume, with ships leaving weekly for both countries. No. 2 cast and stove plate are being purchased in small amounts at $6.50 and $6.25 a ton respectively for delivery to the British Isles. It is quite possible that No. 2 cast purchases will soon be curtailed.

The International Acetylene Association will hold its thirty-sixth annual convention at the Cleveland Hotel, Cleveland, Nov. 12 to 15. H. F. Reinhard, 30 East Forty-second Street, New York, is secretary.

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Bonneville Project Is Outstanding on Coast

SAN FRANCISCO, July 8.—Approximately 7800 tons of steel is involved in two contracts for work at Bonneville Dam, on which bids are being opened soon at Portland, Ore. Bids go in this week on the main gates and three cranes, requiring 5600 tons of structural steel, 332 tons of steel castings and 449 tons of miscellaneous steel. Tenders will be taken July 17 on 1950 tons of shapes and miscellaneous steel for the lock-operating equipment. The construction of the fishways, for which plans are being completed, will call for 1350 tons of reinforcing bars and 160 tons of structural steel.

Among the limited number of new projects reported during the past week the contract for a theater at Stanford University, at Palo Alto, Calif., was outstanding. Preliminary estimates indicate that 1000 tons of structural steel will be required. At San Francisco, plans are being completed and bids will be taken shortly for a 10-story Class A office building. The improvement program at the San Diego naval base will involve approximately 2500 tons of structural steel. Contracts for this work will probably be let during the last half of the year.

A recent increase in the shipment of scrap to the Orient may be explained in part by the limiting of purchases by local mills, which are paying but $9.50 per gross ton.

Mill prices are holding steady, and the trade has not brought pressure for downward revision. Warehouse business continues on about the same level.

Business Drags Bottom In South

BIRMINGHAM, July 9. — New bookings have been lighter on account of the Fourth of July holiday. Current business is still made up largely of small orders to cover immediate needs.

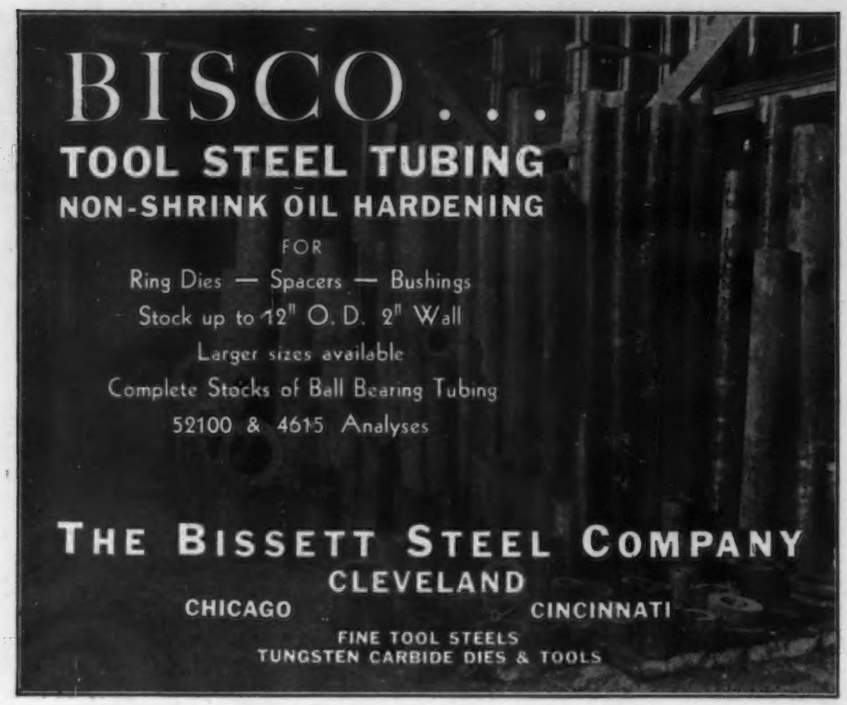
Republic Steel Corpn. blew out its No. 1 furnace on July 1, and the district's total of active furnaces is now six.

There are also six active open-hearth units, the same as for several weeks past.

Virginia Bridge & Iron Co., through its Roanoke office, has been awarded about 950 tons of structural steel by the Tennessee Valley Authority for construction of the Norris Dam power plant.

Pressure pipe business is low and still awaiting release of new Federal projects. Local plants are operating about three days a week, with part of the production going into stocks.

Birmingham Stove & Range Co. has completed and placed in operation a new enameling plant, the first in Alabama. This new plant has a daily capacity of 10,000 lb. of cast iron or 3000 sq. ft. of steel.



Fabricated Structural Steel

Lettings in Good Volume—New Projects Gain

STRUCTURAL steel lettings of 21,800 tons compare with 7000 tons last week. Sizable bookings include 8800 tons for the Bronx approach to the Triborough bridge in New York, 2150 tons for a mill building for the Union Bag & Paper Co. at Savannah, Ga., 1525 tons for the Stroh brewery at Detroit, and 1000 tons each for two apartment houses in New York. New projects of 19,500 tons compare with 9000 tons in the previous week and 56,675 tons two weeks ago. Public works account for the bulk of new jobs which include 5250 tons for two dams in the Mississippi River, 2900 tons for a roller dam at Winfield, W. Va., 2500 tons for improvements at the San Diego naval base and 2200 tons for a bridge at Meredosia, Ill. Plate lettings total 1185 tons. Structural steel awards for the week follow:

NORTH ATLANTIC STATES

Lakeville, Conn., 100 tons, school, to Berlin Construction Co.

New York, 1000 tons, apartment house on West End Avenue, to Harris Structural Steel Co.

New York, 265 tons, pier reconstruction for Triborough Bridge, to Post & McCord, Inc.

New York, 1000 tons, apartment house on Madison Avenue, to Harris Structural Steel Co.

New York, 8800 tons, Bronx approach to Triborough Bridge, to McClintic-Marshall Corpn.

Flushing, N. Y., 830 tons, incinerator, to Karl Koch Erecting Co.

Brooklyn, 310 tons, American Molasses Co. building, to Ingalls Iron Works Co.

Tarrytown, N. Y., 310 tons, building for Marymount College, to an unnamed fabricator.

New York, Chicago & St. Louis Railroad, 960 tons, viaduct at State Line, Pa., to McClintic-Marshall Corpn.

Mayview, Pa., 275 tons, buildings for mental defectives, to Levinson Steel Co.

SOUTH AND SOUTHWEST

Savannah, Ga., 2150 tons, Union Bag & Paper Mill, to Jones & Laughlin Steel Corpn.

Orlando, Fla., 465 tons, S. H. Kress store, to Ingalls Iron Works Co.

Miami, Fla., 125 tons, causeway repairs, to American Bridge Co.

New Orleans, 240 tons, still house for United States Industrial Alcohol Co., to McClintic-Marshall Corpn.

Maricopa County, Ariz., 195 tons, State bridge over Hassayampa River, to Wisconsin Bridge & Foundry Co.

CENTRAL STATES

Cincinnati, 285 tons, Neisner store, to Ingalls Iron Works Co.

Detroit, 1525 tons, Stroh Brewery Co. buildings, to R. C. Mahon Co.

Chicago, 130 tons, Ashland Avenue bridge, to Duffin Iron Works.

Harvey, Ill., 155 tons, factory extension, to unnamed fabricator.

Wilmington, Ill., 410 tons, coal washing plant, to Ohio Structural Steel Co.

Philadelphia, 228 tons, 10,000 ft. of welded pipe for Fort Mifflin, to Lancaster Iron Works.

Alton, Ill., 400 tons, leer building for Owens-Illinois Glass Co., to McClintic-Marshall Corpn.

Oakley, Ill., 100 tons, bridge, to Mississippi Valley Structural Steel Co.

Blodgett, Ill., 740 tons, State highway bridge, to McClintic-Marshall Corpn.

Climax, Minn., 100 tons, bridge No. 5425, to American Bridge Co.

St. Paul, Minn., 770 tons, highway bridges, to McClintic-Marshall Corpn.

WESTERN STATES

Monterey County, Cal., 157 tons, two State bridges, to Judson-Pacific Co.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Haverstraw, N. Y., 250 tons, public school.

THE SOUTH

Winfield, W. Va., 2900 tons, roller dam.

Wellsburg, W. Va., 175 tons, bridge.

Lafourche, La., 1550 tons, bridge.

Raceland, La., 1550 tons, bridge.

CENTRAL STATES

Middletown, Ohio, 750 tons, cold strip building for American Rolling Mill Co.

Meredosia, Ill., 2200 tons, bridge.

Le Claire, Iowa, 1100 tons, locks; bids Aug. 3.

Burlington, Iowa, 3300 tons of structural and 175 tons of castings, dam No. 18 across Mississippi river; bids Aug. 14.

Des Moines, Iowa, 400 tons, General Motors warehouse.

La Crosse, Wis., 1950 tons of structural and 345 tons of castings, dam No. 7 across Mississippi river; bids Aug. 8.

WESTERN STATES

Denver, 400 tons, addition to mint.

Palo Alto, Cal., 1000 tons, theater at Stanford University; plans being completed.

San Jose, Cal., 150 tons, passenger station for Southern Pacific Co.; bids about July 15.

San Diego, 2500 tons, improvements at Naval Base.

Lodi, Cal., 100 tons, post office; bids July 31.

Los Angeles, 165 tons, tunnel beams for Metropolitan Water District, Consolidated Steel Corpn. low bidder.

Los Angeles, 105 tons of structural and 290 tons of miscellaneous steel for Metropolitan Water District for Cajalco Dam, dike and tunnels near Riverside, Cal.; bids Aug. 3.

Bonneville Dam, Ore., 1950 tons of structural and miscellaneous steel lock operating equipment; bids advanced to July 17.

Cowlitz County, Wash., 330 tons, State bridge over Toutle river; bids July 23.

FABRICATED PLATES

AWARDS

Coney Island, N. Y., 200 tons, gas holder to McClintic-Marshall Corpn.

Leetsdale, Pa., 325 tons, oil barges for Gulf Refining Co., to Nashville Bridge Co.

Pittsburgh, 306 tons, two barges for Gulf Refining Co., to Nashville Bridge Co.

Fort Mifflin, Pa., 228 tons, fabricated pipe, to Lancaster Iron Works.

Princeton, Ill., 125 tons, tanks, to Pittsburgh-Des Moines Steel Co.

NEW PROJECTS

Los Angeles, 100 tons, tunnel lining forms, Department of Water and Power, Western Pipe & Steel Co. low bidder.

SHEET PILING

NEW PROJECTS

Port Huron, Mich., 250 tons, breakwater for Duff Sulphite Paper Co.

Burlington, Iowa, 236,000 sq. ft. for dam.

La Crosse, Wis., 112,000 sq. ft. for dam.

Wilmington, Del., 2600 tons for a jetty; bids to be taken by United States Engineers July 22.

Reinforcing Steel

Awards 920 Tons—New Projects 8780 Tons

AWARDS

Sacramento, Cal., 200 tons, Montgomery Ward building, to Soule Steel Co.

San Francisco, 450 tons, for O'Shaughnessy dam, to Truscon Steel Co. and Pacific Coast Steel Corpn.

Maricopa County, Ariz., 167 tons, State underpass, to an unnamed bidder.

Seattle, 100 tons, Ballard trunk sewer, to an unnamed bidder.

NEW REINFORCING BAR PROJECTS

Queens County, N. Y., 500 tons, steel mesh for highway; C. B. Whitmore, Lockport, N. Y., general contractor.

Niagara County, N. Y., 200 tons, steel mesh for highway.

Cleveland, tonnage unstated, Whiskey Island Federal housing project; bids Aug. 15.

Cleveland, tonnage unstated, Outhwaite Federal housing project; bids Aug. 12.

Blue Plains, D. C., 150 tons, sewage project; Kaufman Construction Co., Philadelphia, low on general contract.

La Crosse, Wis., 480 tons, Mississippi river dam.

Burlington, Iowa, 1250 tons, Mississippi river dam.

Le Claire, Iowa, 600 tons, lock.

San Francisco, 300 tons, administration building and toll plaza on Trans-Bay bridge; bids July 26.

Van Nuys, Cal., 200 tons, State home for boys; general contract awarded.

Los Angeles, 125 tons, Gardena high school.

Los Angles, 5125 tons for Metropolitan Water District for Cajalco dam, dike and tunnels near Riverside, Cal.; bids Aug. 3.

Railroad Equipment

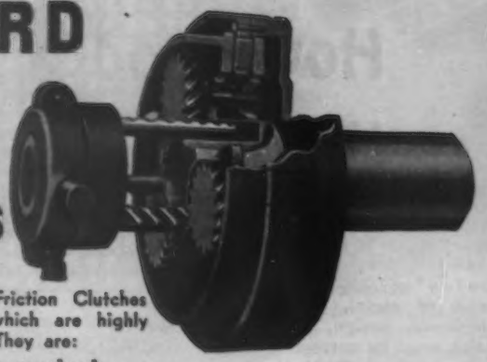
Worcester Street Railway, Worcester, Mass., has ordered three H-9-S motor coaches from American Car & Foundry Motors Co.

Capital Transit Co., Washington, has placed order for 30 H-15-S motor coaches with American Car & Foundry Motors Co.

Board of Transportation, New York, has ordered 500 subway cars for independent subway system as follows: 250 from American Car & Foundry Co., 150 from Pullman-Standard Car Mfg. Co., and 100 from Pressed Steel Car Co.

Brooklyn-Manhattan Transit Corpn. has ordered 100 street cars of Hirshfeld design from St. Louis Car Co. They will be built of Cor-ten high-tensile steel.

HILLIARD Friction Clutches



The principle of Hilliard Friction Clutches assures three advantages which are highly important to clutch users. They are:

1. **Adjustment seldom required.**
2. **Smooth engagement.**
3. **Unaffected by centrifugal force.**

The two friction plates are drawn against the friction ring by worm threaded studs which are operated by spiral gears which in turn are rotated by racks attached to the sliding collar. That's why Hilliard Clutches are economical to use, trouble-free, adaptable to delicate machines as well as rugged ones, and good for high speeds.

Available from 2½ h.p. to 250 h.p.

THE HILLIARD CORPORATION
ELMIRA, N. Y.

Ethyl Gasoline Corpn. has ordered 15 tank cars from American Car & Foundry Co.

Westinghouse Electric & Mfg. Co., East Pittsburgh, has received an order for motors and control for twin six cars being constructed by J. G. Brill Co., Philadelphia, for Delaware River Bridge Joint Commission. Electrical equipment, including all accessories, will cost approximately $299,000.

Canadian National Railways have placed an order with Timken Roller Bearing Co., Canton, Ohio, for bearings to equip engine trucks of four 4-8-2 steam locomotives.

RAILS

Nickel Plate is in the market for 4000 tons of rails.

Wheeling & Lake Erie has placed 1100 tons of rails with Carnegie Steel Co.

Zanesville, Ohio, low bid for relocating Baltimore & Ohio tracks at Dover, Ohio, in connection with Muskingum Conservancy District has been made by Tri-State Engineering Co., Waynesburg, Pa. New rails required will be furnished by the railroad. Low bid for relocating Wheeling & Lake Erie tracks at Dover has been submitted by Arundel Corpn., Baltimore. New rails required will be furnished by the contractor.

Half of States Now Have Sales Tax

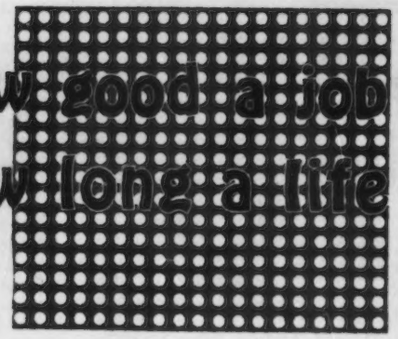
(CONTINUED FROM PAGE 71)

ble personal property only, while Indiana, Mississippi, South Dakota and West Virginia tax also gross receipts from utility services, amusements, communications, advertising, wholesale sales, the value of the output of extractive industries, and service and miscellaneous incomes.

Exemptions are generally limited to those transactions beyond the power of the State to tax, such as sales in interstate commerce, and to sales of articles already heavily taxed, such as cigarettes and gasoline. A few States exempt sales of foodstuffs to ease the burden on the poor.

The proceeds are allocated in a variety of ways, with local governments receiving a share in most States. Relief and schools get the bulk.

Although a majority of the laws have definite dates of expiration, it would be incorrect, the Board points out, to assume that after the emergency has ceased the sales tax laws will be eliminated. In some States both administrators and the public seem convinced that a sales tax is not an unmitigated evil, especially when combined judiciously with other forms of taxation. Finally, in a number of States the return of prosperous conditions will not necessarily mean the resumption of a normal flow of revenue from the tax system as formerly constructed. Limitations on property tax levies already adopted and the strength of this movement, indicate that sales taxes may be retained indefinitely in certain States because no practicable alternative exists.



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WICKWIRE SPENCER perforated metals

Activities Bearing on Machine Tool Distribution

o o o

A Department Conducted by L. M. Waite

o o o

Necessity—Economies —And Economics

VERY recently a good friend of ours, prominent in machine tool circles, made a statement which is so completely at variance with many ideas as to the continuity of necessity for the most modern shop equipment, that we find it difficult to reconcile the statement with facts developed over a long period of years. He said: "When demand for the products of machine tools is great the prices of the products are such that economies of new and better machines are not necessary."

We have no quarrel with the economic theory or fact, upon which the statement may have been predicated. It is true that prices TEND to be increasingly higher as demand strengthens. However, to state that "Economies of new and better machines are not necessary" is seemingly to mis-analyze economic fundamentals of successful production experience. Possibly this was farthest from the speaker's mind but the question has been raised by an IRON AGE reader and, in an attempt to formulate an answer, it is proper to deal with the statement as made, disregarding any possibly intended thought. In so doing it may be to the point to have in mind the records of automobile production and distribution. These are illustrative of constantly prevailing necessity for economies, in producing types of commodities which are largely dependent upon the products of machine tools.

For the complete units of volume production, consistently lowered prices have been recorded over periods of extreme demand. Demand has shown reasonable increases under the price reflection of improved efficiency, through economies of new and better machines. Such units are the largest absorbers of modern machine tools and their products.

Volume production is nothing more nor less than concentrated effort to beat "time" as a competitive element. For such accomplishment, equipment other than the most efficient tends to be marginal.

Marginal Production

In the supplying of machine tool products, many shops, marginally equipped, are elements of destructive competition at times when profits are most needed. Lack of wide equipment resistance to advancing prices is the economic cause for the existence of the marginal producer. Continued lack of resistance tends to prolong his activities. The economies of new and better machines constitute direct resistance to unwholesome competition. The marginal producer does not "carry on," he merely enters the arena and theoretically "lends" himself for a time whenever prices may be high as a result of production inefficiency in its relation to demand. Inasmuch as he is poorly structured his activities are not a key to the advancement of common good.

Based upon the assembly of economic facts, his blight is always due to be rid of, if at all, in one of three ways, by his own increased efficiency, the increased efficiency of those with whom he competes for a time, or by lessened demand. It follows that lack of attention to cost-reducing economies, on the part of the marginal producer and his competitor, will tend to eliminate marginal production via the lessened demand route only. It also follows that lack of attention to cost-reducing economies, on the part of those with whom he competes, will tend to increase the number of marginal producers.

On the records of industrial history, marginal producers are not creators of demand. They blindly follow a beaten path which has been blazed because there is an economic high limit to prices. Such economic service as they render, in the matter of price control, is not directly related to lowered costs. Therefore their normal marginal equipment is not a key to common good.

Prices do TEND to be higher in times of good demand, but this only heightens the wisdom of immediately-increased efficiency in order that advances may not adversely affect demand. Otherwise the demand-reducing tendency of higher prices will become operative and cause purchasers to either go without or to find other means of satisfying their needs.

The difference between what the

ultimate consumer or user is willing to pay, and the total of production and distribution costs, represents profit. The ultimate user is the boss in the matter of selling price. No buyer is under obligation to perpetuate the business of any producer nor will he do so for any reason other than satisfaction with service from that which he proposes to buy. This must be proffered "at a price." Beyond this, in the higher price brackets, he must be "sold." Ninety per cent of the selling must be on the basis of economies which he can readily visualize as elements of advantage. He will often buy such economies when demand is good. He is seldom susceptible to them when business is poor. In machine tool work such economies involve, largely, equipment-ability to get things out faster and without impaired quality.

Economically, quality is a determining price factor, also. Yet often, as in the case of the automobile, thanks to economies through speed and accuracies in modern machine tools, the purchaser may have little concern as to material-quality within any price range which he may select. Under such conditions there is a distinct trend toward "price markets" which call for wide employment of production economies.

In the matter of selling price determination, wise suppliers constantly fathom buyer-minds to acquire knowledge as to what the ultimate consumer will pay proportionately for the products which he supplies. This is especially so in connection with completed units which utilize the products of machine tools. After this he must produce within that price and must at least maintain previous quality. To attain volume of business, he must bait his hook with either lowered price or added quality. Records of successful companies indicate consistent use of both through the economies of new and better machines.

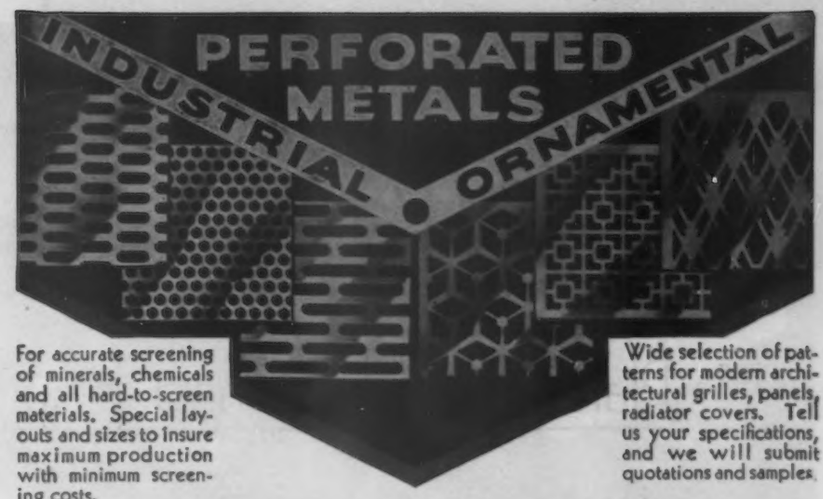
Necessity

Any contemporary review of machine tool sales records the fact that not only are the economies of new and better machines considered necessary in times of good demand, but that they are essential in getting profits out of lower averages in selling prices. It is not unusual to find successful organizations which class as necessary any equipment which will, without impairment of quality, effect an economy of from 5 to 7 per cent.

The Ace in the Hole

The maker who holds the economies of the-new-and-better-machines ace in his possession has the winning hand every time, regardless of demand conditions. From a wide viewpoint, this kind of advantage will serve the common good in strengthening our industrial structure against recurring stresses.

The speed of modern machine tools is direct resistance against necessity for large inventories, in that it provides ability to produce in far closer relation to demand.



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Standards for Foundry Apprentices Adopted

(CONTINUED FROM PAGE 36)

and departments in the shop. They should learn to feel their strength and opportunities for future influence, and should develop a group consciousness. A social organization of the apprentices in the shop is advantageous.

Graduation Should Be Publicly Announced

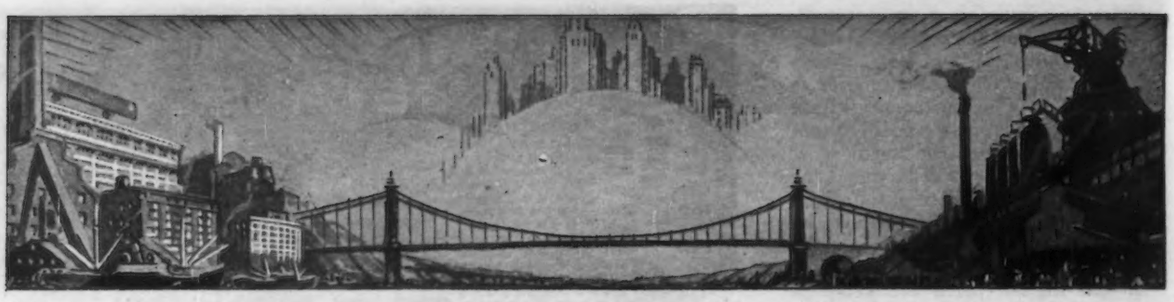
Graduation is the most important event in the career of the apprentice, both from the standpoint of the young man and the employer. The day of graduation is the day to which the young man has been looking forward for many years. It is necessary for the employer to attach to the event the importance which it deserves in the eyes of the apprentice. In some plants the fact that ordinarily only one apprentice graduates on any one day has led to the abandonment of a formal graduation. In other plants the graduation of apprentices is observed in as happy a spirit as any high school "commencement."

Whatever the custom regarding graduation may be, it is important that the apprentice should be officially informed and congratulated as soon as the time is completed. If the contract includes a bonus, it is well to give the boy the check on the day of graduation. Unnecessary delay in this matter, resulting from lack of attention in clerical departments, is inexcusable.

The graduation should be announced publicly and a new rate of pay, appropriate to the new mechanic, should be made effective immediately.

It is also important that the completion of an individual apprenticeship should be fully recognized in shop treatment of the young man whose status has changed. There is always a temptation to continue to treat the graduate as an apprentice for some time after his course is completed.

It must be impressed upon the entire personnel by shop officials that the status of the young man has changed and that he should be shown in every way the respect due a mechanic.



Plant Expansion and Equipment Buying

Machine Tool Industry Faces Active Buying Season—Russian Orders Help

HAVING experienced an active June, partially because of increased prices on some types of tools, the machinery industry seems again to be headed into a period of brisk demand. Automotive buying is just getting underway and promises to be exceptionally heavy, both for replacement and expansion. Chevrolet has placed initial orders in its $5,000,000 buying program for its Detroit gear and axle plant. Chrysler is quite active and Ford is constantly in the market.

According to the American-Russian Chamber of Commerce, Amtorg Trading Corpn. has placed additional orders for $1,300,000 worth of tools with American builders. Recent purchases had already amounted to $3,000,000.

A feature of the equipment business during the last week has been the placing of orders for several large presses by automotive parts makers.

NORTH ATLANTIC

Washburn Wire Co., foot of East 118th Street, New York, manufacturer of round and flat steel wire products, with main offices at Phillipsdale, R. I., has plans for new one and five-story plant, 201 x 252 ft., at 536-50 East 117th Street, replacing part of present works, taken over for approach for new Tri-borough bridge. Cost about $350,000 with equipment. Bart and John P. Walther, 103 East 125th Street, are architects.

Department of Sanitation, Municipal Building, New York, will take bids at once for new municipal sewage disposal works on Ward's Island, comprising group of primary and auxiliary units for sludge-handling and digesting, with pumping stations, power house and other mechanical structures. Cost about $25,000,000 with machinery, for which Federal financing in amount of $11,360,250 has been concluded, balance of fund to be arranged through municipal loan.

Maqua Co., 946 Duane Avenue, Schenectady, N. Y., printer, plans new four-story and basement printing plant, 80 x 140 ft., electric-operated. Cost over $150,000 with equipment. E. E. Talmadge is company architect and engineer.

Signal Supply Officer, Army Base, Brooklyn, asks bids until July 24 for radio receiving and transmitting equipment and spare parts (Circular 168).

Board of Education, Park Avenue and Fifty-ninth Street, New York, plans manual training department in new three-story and basement high school at Springfield, Queens, for which Federal aid in amount of $1,137,681 has been secured. Superstructure will begin soon for new three-story and basement high school at Tottenville, S. I., likewise to be equipped with manual training facilities, for which general contract recently was let to Psaty & Fuhrman, Inc., 369 Lexington Avenue, New York; fund of $976,000 is available for building and equipment. W. C. Martin, Flatbush Avenue Extension and Concord Street, Brooklyn, is architect and superintendent for board.

Municipal Airport Bureau, City Hall, Albany, N. Y., plans extensions and improvements in buildings and facilities at municipal airport, including new hangar with repair and reconditioning department and other structures. Fund of $200,000 is being arranged for buildings and equipment through Federal aid.

Department of Hospitals, City of New York, Municipal Building, plans extensions and improvements in equipment and facilities at baking plant and mechanical laundry at Kings County Hospital, Brooklyn. Cost $109,000, bulk of fund to be expended for new equipment. Financing has been arranged through Federal aid.

Fifth Avenue Coach Co., 605 West 132nd Street, New York, motor buses, has filed plans for extensions and improvements in three-story motor bus body factory and garage. Cost over $30,000 with equipment. Francis Seaman, 140 Cedar Street, is architect.

Chron-Art Electrical Mfg. Corpn., 443 South Nineteenth Street, Newark, N. J., manufacturer of electrical specialties, has leased floor in building at 63 Hoyt Street, for new plant, increasing present capacity.

Board of Education, Sayreville, N. J., plans manual training department in new two-story senior high school. Cost about $160,000. Financing is being arranged through Federal aid. Alexander Merchant, 1 Elm Row, New Brunswick, N. J., is architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 19 for six hoisting and rotating equipments, six hoisting units, six turning gears, six collector rings and brush rigging and spare parts (Schedule 5434) for Philadelphia and Brooklyn Navy Yards.

Advertising Novelty Mfg. Co., 1207 Race Street, Philadelphia, manufacturer of metal and other advertising specialties, has leased floor in building at Thirteenth and Wood Streets, about 5000 sq. ft., for new plant.

Bellanca Aircraft Corpn., Bellanca Field, New Castle, Del., manufacturer of airplanes and parts, plans expansion for development and manufacture of military planes and parts, in addition to present line of commercial models. Temple Joyce, formerly an executive of Berliner-Joyce Corpn., Baltimore, manufacturer of aircraft, has been elected president of Bellanca Company; G. M. Bellanca is chairman of board.

NEW ENGLAND

Fafnir Bearing Co., Booth Street, New Britain, Conn., manufacturer of ball bearings, ball bearing transmissions, etc., has let general contract to Berlin Construction Co., Berlin, Conn., for one-story forge shop, 75 x 112 ft. Cost over $40,000 with equipment.

Quartermaster Depot, Army Base, Boston, asks bids until July 19 for 5000 lb. steel strapping and 10,000 seals (Circular 164).

Wallingford Steel Co., Valley Street, Wallingford, Conn., will proceed with construction by day labor on one-story addition. Cost over $50,000 with equipment.

Kennebec Pulp & Paper Co., Augusta, Me., has leased local mill of Cushnoc Paper Corpn., from Madison L. Gilman, receiver, and will remodel for production of tissue papers. Cost over $75,000 with equipment.

Abell Mfg. Co., Boston, has been organized by George T. Cottle and Arthur C. Marquardt, 20 Crofton Road, Waban, Mass., to manufacture engines and parts, and kindred mechanical equipment.

Hodgman Rubber Co., Framingham, Mass., manufacturer of general rubber products, has plans for one-story addition. Cost over $45,000 with equipment. Isador Richmond, 248 Boylston Street, Boston, is architect.

State Board of Education, State House, Hartford, Conn., has plans for new one-story vocational school unit at State Normal School, New Britain. Cost about $75,000 with equipment. Guilbert & Betelle, 20 Branford Place, Newark, N. J., are architects.

BUFFALO DISTRICT

Scintilla Magneto Co., Sherman Avenue, Sidney, N. Y., manufacturer of magnetos and kindred automotive equipment, has plans for one-story addition. Cost close to $50,000 with equipment. Austin Co., 16112 Euclid Avenue, Cleveland, is architect and engineer. Company is a sub-

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Wizard Foundry Co., Inc., Wellsburg, N. Y., has been organized by William H. Gilbert, 827 West Gray Street, and Conway D. Thomas, 730 Riverside Avenue, both Elmira, N. Y., to manufacture iron and other metal castings.

Leon F. Roberts, mayor, Jamestown, N. Y., is at head of project to erect a new municipal milk product plant, with pasteurizing, mechanical mixing and distributing departments. Cost about $250,000 with machinery. Financing is being arranged through Federal aid.

Board of Education, Churchville, N. Y., plans manual training department in new two-story and basement high school, for which bids will be asked at once on general contract. Cost about $185,000. Lewis J. Brew, 277 Alexander Street, Rochester, N. Y., is architect.

SOUTH ATLANTIC

Draper Corpn., Hopedale, Mass., manufacturer of textile looms and other textile machinery and parts, has purchased former plant of Standard Looms, Inc., East Spartanburg, S. C., now owned by Textile Machinery Corpn. New owner will remodel for new branch plant.

William C. Sleight, Mount Dora, Fla., care of Alan J. McDonough, Daytona Beach, Fla., architect, is at head of project to erect one-story fruit canning and packing plant, 40 x 85 ft., at first noted place. Bids will be asked in about 30 days. Cost about $25,000 with packing, conveying and other equipment.

Warners Machine Shop, Washington, N. C., plans rebuilding part of plant recently destroyed by fire. Loss over $40,000 with equipment. Mutual Machine Co., occupying neighboring site, was also damaged by same fire, with loss close to $30,000, and also plans early rebuilding.

SOUTH CENTRAL

Tennessee Products Corpn., Nashville, Tenn., manufacturer of industrial chemicals, acids, etc., plans one-story addition to plant at Wrigley, Tenn., for production of acetic acids and allied specialties. Cost about $150,000 with equipment.

Board of Education, Marion, Ky., plans manual training department in new three-story high school. Cost about $130,000. H. E. Boyle & Co., Furniture Building, Evansville, Ind., are architects.

Magnolia Cotton Oil Co., Magnolia, Miss., has plans for two one-story additions, 60 x 180 ft., and 30 x 120 ft. Cost over $65,000 including equipment.

Board of Commissioners, Sylacauga, Ala., plans early call for bids for municipal waterworks, including pumping machinery and accessories, pipe lines, fittings, etc. Fund of $30,000 has been arranged. Wiedeman & Singleton, Candler Building, Atlanta, Ga., are consulting engineers.

Brown-Williamson Tobacco Co., 6100 West Hill Street, Louisville, has let general contract to J. F. Russell & Co., 3908 Frankfort Avenue, for one-story storage and distributing building, 190 x 652 ft. Cost over $125,000 with conveyors, loaders and other mechanical-handling equipment.

Water Bureau, Covington, Ky., plans installation of pumping machinery and accessories, filter equipment, pipe lines, etc., for new filtration plant at municipal waterworks. Fund of $750,000 is being arranged through Federal aid. J. S. Watkins, Citizens' Building, Lexington, Ky., is consulting engineer.

Kentucky Macaroni Co., Floyd Street and Southern Railroad, Louisville, has let general contract to J. D. Jennings, 328 East Breck Street, for addition. Cost close to $30,000 with equipment.

OHIO AND INDIANA

Elwell Parker Electric Co., 4205 St. Clair Avenue, Cleveland, manufacturer of factory trucks and parts, lift trucks, etc., has plans for one and two-story addition. Cost about $50,000 with equipment. George S. Rider Co., Marshall Building, is architect and engineer.

City Council, Athens, Ohio, is considering new municipal electric light and power plant, and electrical distribution system. Cost about $400,000. Financing will be arranged through Federal aid.

Wildermuth Brewery, Pomeroy, Ohio, recently acquired by new interests, has plans for modernization and improvements, including new equipment in different departments. Cost over $50,000 with machinery. C. E. Dow, Pomeroy, is architect in charge.

Titanite Alloys Corpn., Euclid, Ohio, has been organized by Walter D. David and S. J. Boughton, care of Kwis, Hudson & Kent, Union Trust Building, Cleveland, representative, to manufacture metal alloy products.

Pretty-Scheffer Co., Coshocton, Ohio, manufacturer of rubber products, plans one-story addition. Cost about $45,000 with equipment.

East Dayton Tool & Die Co., Dayton, Ohio, manufacturer of dies, tools and kindred mechanical specialties, has leased property at Evansville, Ind., for new branch plant.

Rainbow Lithographing Co., 4142 Davis Lane, Cincinnati, has asked bids on general contract for three-story addition, 36 x 38 ft. Cost about $30,000 with equipment. Tietig & Lee, 34 West Sixth Street, are architects.

Contracting Officer, Quartermaster Corps, Jeffersonville, Ind., asks bids until July 20 for 200,000 barrel roller, bronze buckles, ⅝-in. (Circular 126).

State Highway Commission, State House Annex, Indianapolis, has asked bids on general contract for new one and two-story service, repair and garage building for State motor trucks and cars at Fort Wayne, Ind. Cost over $50,000 with equipment.

Scientific Specialty Co., Inc., 412 North Jefferson Street, Huntington, Ind., has been organized by Prentice L. Wearly and Maurice V. Krebs to manufacture optical machinery and other precision equipment and parts.

WESTERN PA. DIST.

Joseph S. Finch & Co., Schenley, Pa., distiller, will soon begin construction of multi-story addition for storage and distribution, with capacity of about 50,000 bbl., for which general contract recently was let to Frank Messer & Sons, 2515 Burnet Street, Cincinnati. Carl J. Kiefer, Schmidt Building, Cincinnati, is engineer.

Aluminum Co. of America, Inc., Gulf Building, Pittsburgh, through its subsidiary, Aluminum Co. of Canada, Ltd., Montreal, has approved plans for new works for treatment of bauxite ore for aluminum production at Arvida, Que., consisting of several one and multi-story units, with power house, machine shop and other structures. Cost close to $1,000,000 with machinery.

Pittsburgh Plate Glass Co., Grant Building, Pittsburgh, has let general contract to John T. Wilson Co., Richmond, Va., for one-story factory branch, storage and distributing plan at Richmond. Cost about $60,000 with equipment.

SOUTHWEST

Shell Petroleum Corpn., Shell Building, St. Louis, has authorized an expansion and modernization program at various oil refineries, including those at Wood River, Ill., Houston, Tex., and Arkansas City, Kan. New equipment will be installed for continuous cracking service for gasoline production. Cost over $1,000,000 with machinery.

Board of Education, Jefferson City, Mo., plans manual training department in new two-story junior high school. Cost about $200,000. Financing will be arranged through Federal aid. Felt, Dunham & Kriehn, 300 West Forty-seventh Street, Kansas City, Mo., are architects.

Monsanto Chemical Co., 1700 South Second Street, St. Louis, manufacturer of industrial chemicals, etc., has let general contract to United Engineers & Constructors, Inc., 1401 Arch Street, Philadelphia, for addition to main plant at Monsanto, near St. Louis. Cost close to $450,000 with equipment.

Tarkio Molasses Feed Mill Co., 1739 Guinotte Avenue, Kansas City, Mo., has approved plans for expansion and improvements in mill, including two four-story additions totaling 42,000 sq. ft. floor space. New machinery, grinding and mixing equipment, conveyors, etc., will be in-

HIRTY MILLION CAP SCREWS STOCKED

At our four warehouses and the factory we maintain a stock of 30 million Cleveland Cap Screws—in a full list of sizes, fine and coarse threads, packed in kegs and cartons for immediate shipment. Hexagon, Flat and Filister heads, Set Screws, Studs, Bolts and Nuts—our stocks are sufficient to carry over almost any emergency. Made by the Kaufman Process, *patented*, our own plant development, you can be sure of uniformity in strength and accuracy throughout our line. A Class 3 fit is standard for cap screws. Catalog D and current Discounts mailed promptly. Order from your Distributor, nearest warehouse or the factory.

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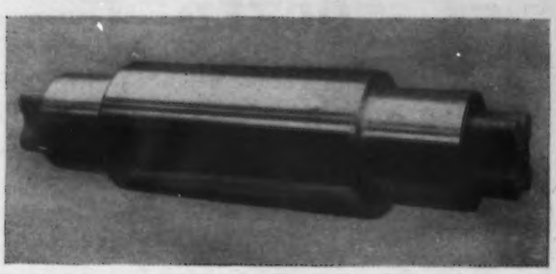
CLEVELAND CAP SCREWS

SET SCREWS • BOLTS AND NUTS

FARREL NI-HARD ROLLS



A 20" x 42" Farrel Ni-Hard Roll for finishing non-ferrous sheets.

for quality and economy

Farrel Ni-Hard Rolls have been developed to meet the demand of the metal rolling industries for a roll combining hardness with high strength and a surface free from pinholes, "orange peel," or other imperfections which mark the surface of the sheet.

They are chilled alloy iron rolls with a hardness from 85 to 90 on the Shore Scleroscope, "C" scale, and are the result of long and careful study and experimentation to develop correct mixture, melting practice and heat treatment.

Each step in the manufacturing process is subject to scientific control, including analysis of materials, controlled melting in an electric furnace, precise heat treatment, physical tests and microphotographs.

The performance of Farrel Ni-Hard Rolls in a number of metal rolling mills has definitely proved their superiority. Their greater hardness and better surface produce a sheet with a finish of notably higher quality than can be obtained with chilled or other types of alloy cast rolls. They are also more economical—requiring less scouring and grinding than any other type of cast roll, their life is longer and their cost per ton of output is lower.

Farrel-Birmingham Metal Working and Rolling Mill Equipment includes: Chilled Iron, Special Alloy Iron and Steel Rolls—Rolling Mills—Rod Mill Tables and Manipulating Equipment—Universal Mill Spindles—Rod Coilers—Hydraulic and Mechanical Presses—Lead Presses for Pipe or Rod—Roll Grinding Machines—Roll Calipers—Gears—Mill Pinions—Drives up to 10,000 H.P.

FARREL-BIRMINGHAM
Company, Inc.
100 Main St., Ansonia, Conn.

stalled. Cost over $250,000 with equipment.

Common Council, Shawnee, Okla., has plans for installation of additional equipment in municipal electric light and power plant, including new Diesel engine-generator set for standby service and auxiliaries. Cost about $60,000. W. R. Holway, 302 East Eighteenth Street, Tulsa, Okla., is consulting engineer.

Board of Education, Library Building, Kansas City, Kan., George Widder, secretary, plans installation of manual training equipment in new three-story high school at Twenty-second Street and Minnesota Avenue, for which general contract has been let to N. P. Severin Co., 222 West Adams Street, Chicago. Cost about $1,900,000 with equipment. Hamilton, Fellows & Nedved, North Tower Court, Chicago, are architects; Joseph W. Radotinsky, Commercial Bank Building, Kansas City, Kan., is associate architect.

Texas Co., Houston, Tex., T. J. Donoghue, vice-president, plans new bulk oil terminal on waterfront at Brownsville, Tex. Cost close to $70,000 with steel tanks and other equipment.

◀ WASHINGTON DIST. ▶

Purchasing and Contracting Officer, Holabird Quartermaster Depot, Baltimore, asks until July 25 for hacksaw blades, drill bits, calipers, hammers, pliers, punches, wrenches, gear pullers, wire brushes, drill gages, bolts, screws, washers, lock washers, hand pumps, valves, etc., and one 2½-ton jack (Circular 160).

Town Council, Galax, Va., plans new municipal electric light and power plant, and distributing system. Cost $582,500 with equipment. Financing is being arranged through Federal aid.

Board of Education, Norfolk, Va., plans manual training department in new two-story and basement high school. Cost about $500,000 with equipment. Clarence A. Neff, Lochhaven, Norfolk, and Rudolph, Cooke & Van Leeuwen, Arcade Building, are architects.

Commanding Officer, Naval Air Station, Norfolk, Va., plans extensions and improvements in electrical power distributing system at naval operating base, including waterfront lines. Cost about $120,000 with equipment. Appropriation is being arranged.

Quartermaster Depot, Twentieth and C Streets, N. W., Washington, asks bids until July 19 for 200 5-kw. gasoline-electric generator sets, with auxiliary equipment (Circular 242).

Celanese Corpn. of America, Inc., Amcelle, Cumberland, Md., manufacturer of cellulose rayon products, is considering one and multi-story additions to mill. Cost over $100,000. Headquarters are at 180 Madison Avenue, New York.

Construction Service, Veterans' Administration, Arlington Building, Washington, asks bids until July 23 for addition to boiler plant at institution at Bronx, New York, including boilers and complete auxiliary power equipment.

◀ MICHIGAN DISTRICT ▶

Dodge Brothers Corpn., 7900 Joseph Campeau Avenue, Hamtramck, Detroit, a unit of Chrysler Corpn., 341 Massachusetts Avenue, is considering one-story heat-treating unit. Cost over $50,000 with equipment.

Board of Public Works, Ann Arbor, Mich., asks bids until July 22 for vacuum filter, not less than 165 sq. ft. filtering area, for new municipal sewage treatment works, including auxiliary equipment. Shoecraft, Drury & McNamee, State Savings Bank Building, are consulting engineers.

Chevrolet Motor Co., 3044 West Grand Boulevard, Detroit, has let general contract to Weber Construction Co., Bay City, Mich., for one-story addition to branch plant at Bay City, 220 x 240 ft., for parts production. Cost over $250,000 with equipment; E. S. Wellock is local plant manager. Company has taken over former crankshaft manufacturing plant of General Motors Corpn., of which it is a subsidiary, at Saginaw, Mich., for expansion in works in that city. Plans are under way for remodeling and for one-story addition, entire unit to be equipped for production of forgings and other parts, bumpers and kindred equipment. Cost close to $200,000 wtih machinery.

Falleen Drop Forge Corpn., Filer City, Mich., has been formed with capital of $200,000 to manufacture drop forgings and kindred products. Anna Falleen, Manistee, Mich., is company representative.

Airtemp, Inc., Detroit, has been organized by Walter P. Chrysler, Jr., president, Chrysler Corpn., 341 Massachusetts Avenue, and associates, to manufacture air-conditioning equipment and parts. Local plant will be operated for new line of production.

◀ MIDDLE WEST ▶

Quaker Oats Co., 141 West Jackson Street, Chicago, plans two-story addition to branch plant at Akron, Ohio, 175 x 200 ft. Cost over $100,000 with equipment.

Marion Auto Body Co., 5923 Ashland Avenue, Chicago, has let general contract to Smedberg-Nordell Co., 7937 Indiana Avenue, for one-story addition, 50 x 112 ft. Cost over $40,000 with equipment. James Bednarik, 1643 West Garfield Avenue, is architect.

Western Clock Co., Inc., La Salle, Ill., has let general contract to T. A. Brown Construction Co., Peterborough, Ont., for

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GARLOCK 7021
CHAMPION
GARLOCK 7021
Compressed Asbestos Packing —the Ideal Gasket Sheet for Severe Conditions.

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If GARLOCK 7021 could talk that's what he would say. He has a fine record and has a right to boast of his strength and endurance. GARLOCK 7021 is especially recommended for gaskets for pipe lines and equipment handling gasoline, oil, gas or steam at high temperatures and pressures. When the job is tough . . . when the service is severe . . . GARLOCK 7021 can take it!

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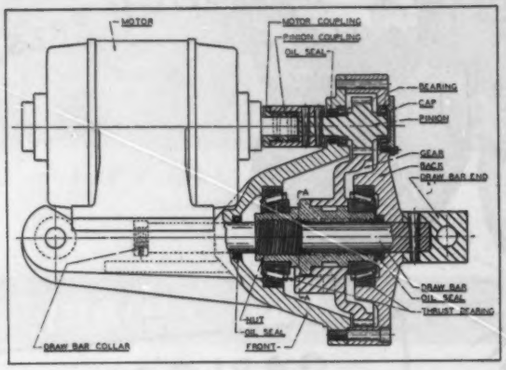
PULL-PUSH POWER

ELECTRICALLY OPERATED STRAIGHT LINE POWER UNIT



DESCRIPTION:

The power load is carried at equal speed in either direction.
The time cycle is based on a 4" stroke in one second.
Lifting power 160 to 2300 lbs.
Impelling force 3000 to 35,000 lbs.
All moving parts in oil bath.
Cost of current practically nothing.
Standard housing can be of base, clevis or flanged type.

PURPOSES:

Vises, Clamping Fixtures, Arbor Presses, and Jacks.
Power Clamps for shears and welding machines.
The moulding presses of plastic materials such as bakelite, rubber, clay, etc.
Die casting machines—for die movement and drawing cores.
Industrial doors—to open and close.
Many other purposes.

ASK FOR BULLETIN No. 127

Other Products: Hand Operated Lathe Chucks—Catalogue 48.
Power Chucks—Bulletin 120C. Power Wrenches—Bulletin 138.

THE CUSHMAN CHUCK COMPANY, HARTFORD, CONN.

two-story addition, 80 x 100 ft., to plant of subsidiary, Western Clock Co. of Canada, Ltd., Peterborough. Cost close to $60,000 with equipment.

John Deere Tractor Co., Miles and Commercial Streets, Waterloo, Iowa, manufacturer of farm tractors, parts and other agricultural equipment, has taken out permit for one-story addition, 120 x 240 ft., adjoining machine shops, for inspection, distribution and other service. Cost close to $60,000 with equipment. Jens Oleson & Sons Construction Co., 1670 Sycamore Street, is general contractor.

Minnesota Mining & Mfg. Co., 791 Forest Street, St. Paul, Minn., manufacturer of sandpaper and other abrasive products, has plans for one-story addition to raw material plant at Wausau, Wis., 75 x 200 ft. Cost over $50,000 with equipment. Toltz, King & Day, Inc., Pioneer Building, St. Paul, is architect.

Board of Education, Two Harbors, Minn., plans installation of manual training department in two-story addition to high school, 100 x 150 ft., for which bids will be asked on general contract in August. Cost $115,000. Financing has been arranged through Federal aid. Erickson & Co., Alworth Building, Duluth, Minn., are architects.

Commanding Officer, Twentieth Observation Squadron of Colorado National Guard, Denver, plans extensions and improvements in local airport and facilities, including new hangars with repair and reconditioning shops, oil storage and distributing building, technical laboratories and other structures. Cost $150,000 with equipment. Financing is being arranged through Federal aid.

◀ PACIFIC COAST ▶

Metropolitan Water District of Southern California, 306 West Third Street, Los Angeles, asks bids until Aug. 20 for wire and cable for new steel tower transmission line from Boulder Dam power plant, Boulder City, Nev., to five main electric-operated pumping plants at Iron Mountain, Eagle Mountain, Hayfield and Gene, along route of Colorado Aqueduct System, totaling 237 miles. Requirements include about 6,000,000 lb. copper cable or equivalent aluminum, bids to include alternates for hollow copper conductors and steel reinforced aluminum conductors; also at same time, bids for structural steel towers for 230-kv. power line. Cost about $5,000,000. Financing has been concluded with RFC for $36,000,000 for entire project. Bids for other equipment and construction will be asked soon. F. E. Weymouth is general manager and chief engineer.

Commanding Officer, Naval Air Station, San Diego, plans new one-story equipment storage and distributing building for air corps division, cost about $80,000 with equipment; also similar building for quartermaster department, cost $50,000 with equipment, and one-story automobile service, repair and garage building, cost $50,000 with equipment. Appropriations are being arranged.

Gaffers & Sattler, 4561 East Fiftieth Street, Los Angeles, manufacturer of stoves and parts, has let general contract to William P. Neil Co., Ltd., 4814 Loma Vista Street, for one-story addition, 120 x 230 ft., with extension, 20 x 30 ft., for an iron enameling works. Cost about $85,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 16 for one motor-driven metal-cutting hacksaw (Schedule 5460) for Puget Sound Navy Yard; until July 19, fuel oil burners and spare parts (Schedule 5464), and spare parts for electric storage batteries (Schedule 5469) for Mare Island Navy Yard.

Taylor Milling Co., Stockton, Cal., plans rebuilding part of grain and feed milling plant recently destroyed by fire. Loss over $300,000 with machinery.

Magnus Co., Inc., 860 North Main Street, Los Angeles, manufacturer of brass and bronze castings, etc., has let general contract to Austin Co. of California, 777 East Washington Street, for new one-story foundry, about 50,000 sq. ft. floor space. Cost about $100,000 with equipment.

◀ FOREIGN ▶

British Malaya Broadcasting Corpn., Ltd., Singapore, Straits Settlements, recently organized with capital of $500,000, plans new local broadcasting station, with steel towers, radio antenna, power house and other structures. Cost about $100,000 with equipment.

Austin Motor Co., Ltd., Birmingham, England, manufacturer of small type automobiles and parts, has plans for one-story addition, totaling about 150,000 sq. ft. floor area. Cost about $250,000 with machinery.

Public Works Tender Board, Wellington, New Zealand, asks bids until Sept. 17 for electric lift equipment, including lift car, counterweight control and safety gear, control and signalling equipment, landing doors, etc.

Burns Mfg. Co., Niagara Falls, Ont., manufacturer of cutlery products, plans new one-story factory. Cost close to $45,000 with equipment.

Steel Exports Higher In May

WASHINGTON, July 9.—Reflecting a gain of 39.6 per cent, exports of iron and steel in May rose to 286,599 tons compared with 205,336 tons in April. In the five months ended with May, this year, exports aggregated 1,306,247 tons as against 1,033,764 tons in the corresponding period of 1934.

As usual, the bulk of exports consisted of scrap. The shipments in May of the present year amounted to 209,425 tons, sharply rising from the April total of 131,731 tons. For the five months ended with May of this year scrap exports were 900,844 tons compared with 595,732 tons in the corresponding period of last year. Of the shipments of scrap in May of the present year 118,291 tons went to Japan.

The largest movement of finished steel exported in May was in black steel sheets, with a total of 9363 tons, followed by galvanized steel sheets, 7445 tons, with tin plate exports amounting to 7349 tons.

Resistance Wire. Wilbur B. Driver Co., formerly Gilby Wire Co., Newark, N. J.—New 60 page resistance handbook, containing many tables and charts pertaining to design and construction of electrical heating units.

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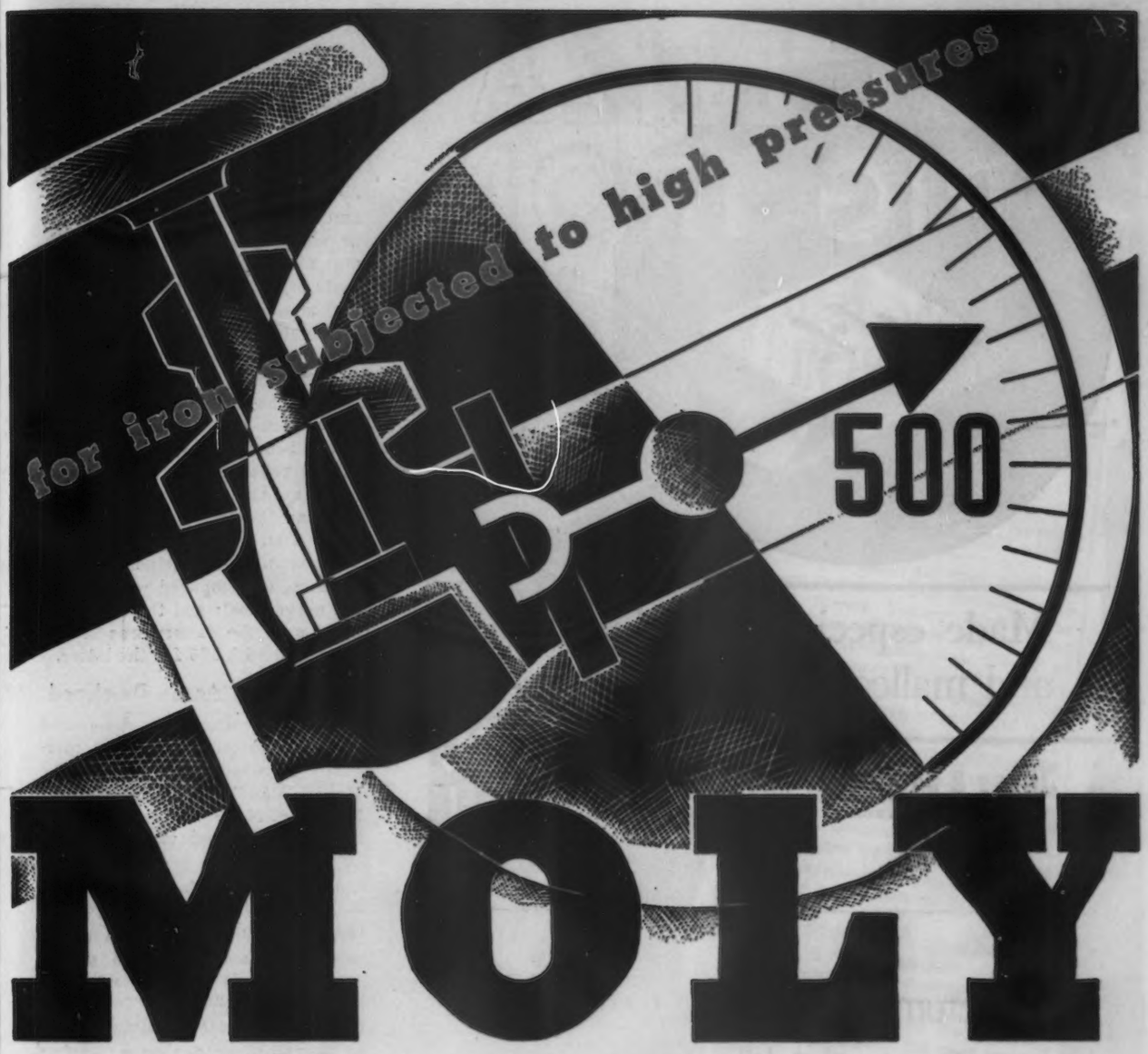


MOLY

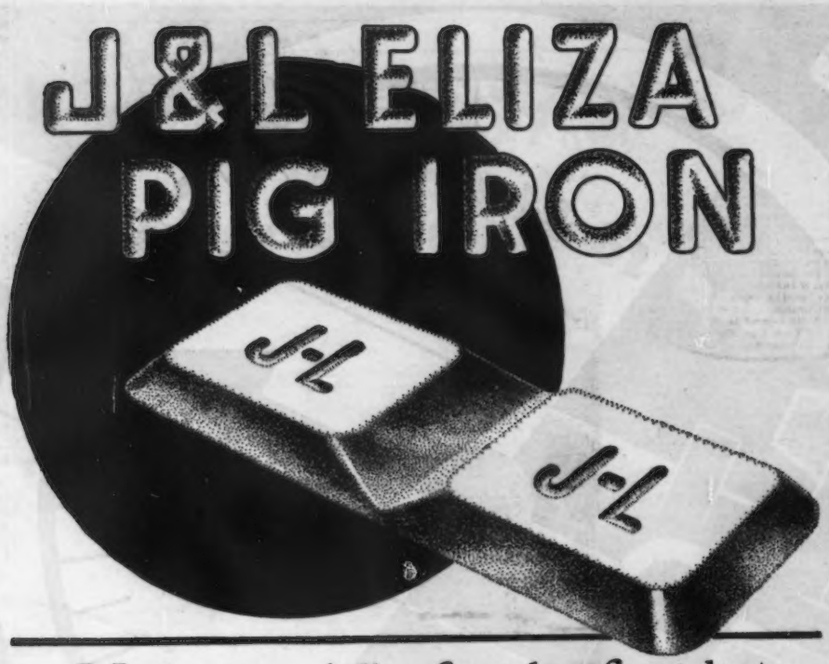
ADVANCING civilization has ever demanded inventions and mechanical improvements to meet its faster economic pace and higher industrial standards. Greater speed — in transportation and in production — has put heavier strains on machinery . . . which in turn, have put higher pressures and other stresses on the irons and steels going into their construction.

For example, more and more is being demanded of such iron castings as Diesel and gasoline engine liners, valves, cylinder blocks, condenser heads, etc. *The most economical and efficient of all methods for meeting the increasingly stringent specifications is by resorting to a Molybdenum-alloyed gray iron.*

Example: A concern producing cast iron steam valves had been using an alloy iron (with no "Moly") which passed the 250 lbs. test against leakage, but almost invariably permitted leaks at 350 lbs. They changed the alloy content to .45% Moly and .25% Chrome — cutting their alloy cost from .62c per pound to .45c per pound — *and the valves did not leak even at 500 lbs. pressure.*

Moly is gaining more and more the reputation as the outstanding alloy element of the age. Keep up to date with the developments that are constantly making progress . . . let us put you on the mailing list of our periodical news sheet, *"The Moly Matrix."* And, while you are sending us your name and address for this purpose, your further request for these two books will be gladly complied with: *"Molybdenum in* 1934" and *"Molybdenum in Cast Iron — 1934 Supplement."* Still further, if you've an alloy problem that's hard to solve — either from an economy or an efficiency standpoint — our metallurgists and Detroit laboratories are at your disposal. Climax Molybdenum Company, 500 Fifth Avenue, New York City. (In Canada: Railway & Power Engineering Corp., Ltd.)

CLIMAX Mo-lyb-den-um



Made especially for the foundry and malleable trade . . . no scrap

JONES & LAUGHLIN STEEL CORPORATION
AMERICAN IRON AND STEEL WORKS
PITTSBURGH, PENNSYLVANIA

J&L STEEL

Late Returns from Laboratory and Mill

(CONTINUED FROM PAGE 32)

substantial saving in the weight allowance for piping is thereby possible.

The soldered joint itself has proved to be adequately strong, light, and reliable in the hands of average workmen. Specially designed fittings result in soldered assemblies with more constant internal diameters which result in improved stream - line flow for liquids. There is also an elimination of erosion which often occurs near abrupt changes in internal diameter.

Fittings on all types of naval work are of naval bronze. If the service is that for low-pressure steam, lubricating oil or air, a copper tubing and fixtures are used and the joints are secured with a copper - silver solder. For fresh water at low pressure, copper tubing and fixtures are used with tin-lead solder, and to carry sea water a copper-nickel alloy tubing is employed with a tin-lead soldering compound.

Straight-Line Relief for Cutters and Hobs

A GREAT many cutters and hobs are marketed with the conventional curved relief even though some experimenters contend that this curved relief has a tendency to rub in action instead of cutting freely. Patent No. 410677, held by Challier of Turin, Italy, provides for a straight-line relief, as shown in Fig. 2. These patents have been acquired by a prominent English tool maker, who is now turning out large quantities of high-speed form-relieved cutters of this type.

The straight-line relieved cutter suffers no deterioration in shape during its life. It is said to withstand two to five times more regrinding than the ordinary tooth, and after each regrinding it presents a perfectly clean, sharp edge and maintains a profile which remains strictly constant in a radial direction, if the teeth are ground radially. There is ample support behind the cutting edges. Tests have been conducted to compare straight-line relieved tools with curved relieved tools. The former averaged 970 pieces per grind whereas the latter averaged only 405. Tool consumption for the straight tool per grind averaged 0.2 mm., as compared with 0.5 for the curved tool; and the daily production of the former was 190 as compared with 105 for the latter.

New Plating Anode Developed

A NEW plating anode designated as Zam (zinc, aluminum, mercury) is now being marketed by Hanson-Van Winkle-Munning Co., Matawan, N. J. The makers claim that this new anode is not attacked by either acid or cyanide solution until the current is applied. Thus it remains free from sludge and can be completely used in a zinc solution. Inasmuch as no sludge forms, there is no anode polarization and consequently there is practically no increase of voltage either at the start or during a plating operation.

Ordinary zinc anodes usually require increasing current density as the anode coats over with decomposed zinc. The higher pressure results in more hydrogen in deposits, which in turn causes heavy coatings to be brittle and nonadherent. The new Zam anodes, however, are said not to develop any coatings during plating and thus the hydrogen in deposits is greatly reduced, thereby improving adherence and ductility of platings.

The anodes can be used in cadmium solutions and will convert such a solution into a zinc solution without much difficulty. The plating operations can be carried on without interruption until the cadmium solution is completely converted to a zinc solution, after which the highest efficiency of zinc deposition can be obtained.

REVERE BRONZE
NEW SENSATION
IN HOLLYWOOD
Loretta Young Chooses
All-Metal Ensemble
DRESSMAKING WITH PLIERS
Whiting & Davis Co. have perfected a new metal-mesh of specially processed Revere Victory Bronze. The spiders for this fabric are machined in many designs ... flat, domed or beaded, square or round, with or without a face design. These spiders are hooked through rings ... and form a gold mesh which is made into hats, capes, gloves, bags, collars, and scarfs.
Miss Loretta Young is wearing a light-weight dusty-gold ensemble which has become a new vogue in Hollywood. Dressmakers fashion such new creations by snipping the rings with pliers along the desired lines, and fastening seams with an extra series of spiders.
Victory Bronze is just one of Revere's products. It illustrates how a metal can be successfully adapted for new uses in many fields.
Are you interested in finding the most efficient metals for your products ... metals that machine easily ... metals with special advantages of strength, finish or corrosion resistance ... metals that lower production costs? Our Technical Advisory Service will gladly cooperate with your designers and engineers. Address our Executive Offices for further details on this service.

Courtesy of Whiting & Davis Co.

Revere Copper *and* Brass

INCORPORATED

Founded by Paul Revere 1801

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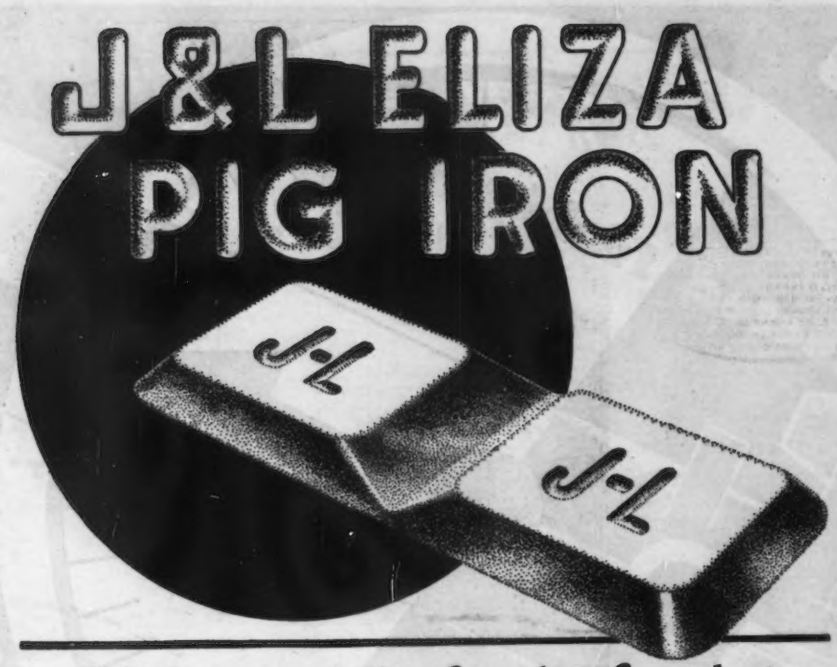

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REVERE BRONZE NEW SENSATION IN HOLLYWOOD

Loretta Young Chooses All-Metal Ensemble

DRESSMAKING WITH PLIERS

Whiting & Davis Co. have perfected a new metal-mesh of specially processed Revere Victory Bronze. The spiders for this fabric are machined in many designs... flat, domed or beaded, square or round, with or without a face design. These spiders are hooked through rings... and form a gold mesh which is made into hats, capes, gloves, bags, collars, and scarfs.

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Victory Bronze is just *one* of Revere's products. It illustrates how a metal can be successfully adapted for new uses in many fields.

Are you interested in finding the most efficient metals for your products . . . metals that machine easily . . . metals with special advantages of strength, finish or corrosion resistance . . . metals that lower production costs? Our Technical Advisory Service will gladly cooperate with your designers and engineers. Address our Executive Offices for further details on this service.

Courtesy of Whiting & Davis Co.

Revere Copper *and* Brass

INCORPORATED

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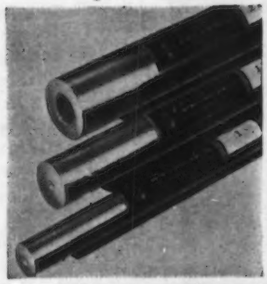
AIDS TO INDUSTRY



● There is no bushing or bearing problem—not even an annoyance from that source—in thousands of plants in all industries throughout the world where exists in desk drawer, drafting room or shop a list of Bunting Bronze Standardized Bearings. Here is every bushing or bearing required in practically all machinery production and maintenance—over 500 different sizes—instantly available almost everywhere in any quantity great or small, made of a special and superior bronze alloy developed in our own research laboratories for the great mass of usual applications. Write for this list—we will gladly send you as many copies as you require. One of these lists is practically the same as a stock of more than 5,000,000 bronze bearings of over 500 different sizes from ⅜ x ¼ x 1¼ to 4½ x 4 x 7.

The next time you buy bronze bars ask for the Bunting machined and centered 13" bar. You will save in labor alone far more than the cost of the bar, if you have been using rough cast bars. 121 stock sizes at all leading supply wholesalers.

Haven't you often wanted a better, more easily handled industrial Babbitt? Here it is. Bunting Babbitt is the amazing anti-friction metal developed by a great staff of metallurgists for industrial use. Ask your supply dealer.

THE BUNTING BRASS & BRONZE COMPANY, TOLEDO, OHIO

Branches and Warehouses in All Principal Cities

BUNTING Quality

BRONZE BUSHINGS • BEARINGS

MACHINED AND CENTERED BRONZE BARS

ANTI-FRICTION METAL

JUST BETWEEN US TWO

REGULAR readers of this column—15, count 'em—were contemptuous of and somewhat indignant about the A-B-C-in-hotel-washroom problem given here June 27. They found it insultingly simple.

Alfred C. Buttfield, Vulcan Detinning's v.p., dashed off the solution left-handed: *A laughs, so either B or C is smudged. C is unmarked. Therefore B has a dirty face.*

E. W. Herrmann of American Cast Iron Pipe says B looked into the mirror. Thinking time, one second.

ACCORDING to Don Masson, technical editor of the Bakelite Corpn., Tiffany advertising says more than "Tiffany & Co., Silverware." *"They are advertising prices now!"* he writes, proving that high hats and hard times are incompatible.

Don sends in a problem in logic which would take the curl out of Einstein's hair. Those who scornfully waltzed through the hotel washroom problem without even breaking step will trip, we hope, over it. It will appear here soon.

WE had an idea that business in general last month lacked the bounce it had in June '34, and were astonished no end to find that not only did more new subscribers come with us than in the preceding June, but that the month beat all other Junes back to 1927.

OUR complaint about the use, in a machinery description, of a certain inelegant and redundant expression, almost cost this column one of its fifteen readers, we learned indirectly. We were accused of bad taste, when all we were trying to do was to elevate journalistic standards, proving that the path of the reformer calls for knee-action wheels.

SOMEONE is pulling the leg of the "Voice of Experience," radio's Beatrice Fairfax. In a recent broadcast the "Voice" reported, we are told, that scrap had been used in making the steel employed in the construction of a bridge in eastern United States.

The horrified and hoaxed "Voice," according to our informant, read a letter from a steel mill operating man who said he had actually seen the scrap charged into the open hearth. If the "Voice" vows he will not cross a bridge, ride in an automobile, enter a building or pare his corns with a razor fabricated from other than steel made with an all-pig iron charge, he will henceforth do no crossing, riding, entering or paring.

OUR half-year circulation statement is now on the fire and will be ready soon. Unless we have made an error in long division, the subscription renewals mount to the altitudinous figure of better than 83 per cent. More later.

TAYLOR-WHARTON'S John Howe Hall writes:

"Your reference to a man being fired for saying something about a thing being 'pretty good' recalls to my mind the yarn of the Frenchman who explained the glories of something-or-other to an American with the classic phrase, 'Mais, mon ami, c'est superb, magnifique! What you call in America 'pretty good'!"

"May I say this applies to The Iron Age. I do like Pat Dwyer, though!"

Who doesn't?

A REPRESENTATIVE of a photographic service located in New York City recently called upon a subscriber who had an article in one of our June issues and declared his firm to be "official photographers" for The Iron Age. This is news to us. We didn't know we had any. As a matter of fact, we haven't. On your guard.—A.H.D.